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COMPARING RATES.

IN NOVEMBER, December and January, 1912-13 we published a compilation of data on telephone rates in cities of 10,000 population and over. This information was tabulated in such a way that the rates of cities of similar size were directly comparable, thus showing at a glance if the rates in any town were higher or lower than the general rule.

In ordering a set of these particular numbers of TELEPHONE ENGINEER the other day J. F. Carter, Jr., manager of the industrial division of the New Orleans Association of Commerce, offered the following problem:

> As you know, commercial bodies over the whole country are, and have been, investigating telephone rates. It strikes me, however, that their investigations are not well founded, as their comparisons are hardly as fair as they might be. To compare the rate of one city with the rate of another, without thought of the mileage covered, the services given, etc., is hardly a comparison.

This gives us opportunity to point out to those who may not have thought about it, that comparison can never be a proper basis for rate making. The fact that Jonestown, with 25,000 inhabitants, has a business rate of six dollars a month, while Smithburg, whose population is also 25,000 gets equivalent service for three dollars a month, is of no value whatever as an argument that Carpentersville's 25,000 population should enjoy a three dollar rate, or that the Carpentersville Telephone Company is entitled to a six dollar rate. Nor if all three of these hypothetical cities had identically the same rates is it any assurance that that rate is equitable or scientific. About the best thing we can say for rate comparisons is that they are very interesting to telephone men, just as salary comparisons are always interesting to workers; and that they excite deeper and assumably more scientific investigation.

Of course, there is only one method of determining correct rates; and that is to ascertain exactly what the service costs to manufacture and sell. This process of cost figuring, quite simple in the case of an article of merchandise, is, however, extraordinarily complicated with such an intangible product as telephone service. Indeed, there are so many factors entering into the calculation, and so many angles at which each factor may be scrutinized, that hardly two experts agree on any one constant. But this condition is improving, and becomes better with each attack made upon it.

A great many telephone rates have been founded on guess and experiment. A great many more have been founded on comparisons. When we question the latter we find the guesses and experiments were the bases for comparison. We are hoping that some day will evolve a unit, whereby an engineer of no extraordinary qualifications may work out a rate system for any community that no man may say is either too high or too low.

KNOCKS.

PRAISE for the telephone has become commonplace. When we do run across an occasional maligner of the institution, his expressions are generally couched in such semi-facetious vein that we doubt his sincerity, and charge his outburst to momentary spleen.

But this last month there must have obtained some untoward condition among the planets that control the destiny of the universal transmitter of language. Three distinct attacks on the value, decency, economy and safety of the telephone habit have reached us within that short period.

A North Carolina judge, in his charge to the jury, declared that he was against the telephone first, last and all the time. It was, he said, a great instrument for immorality. It was not only provocative of immorality, but it had increased the cost of living at least thirty per cent. The telephone, according to Judge Carter of Asheville, induces "boys and girls to say things to each other, which they would not dare say face to face."

The telephone, he said, was an additional bane to civilization, because it induced people to order things thoughtlessly from merchants, when without the telephone there would be no such extravagance. It was a contributory cause to the private extravagance which has so largely increased the cost of living. "This same extravagance," Judge Carter says, "finds expression in the purchase of automobiles, by people who could not buy shoes, were their honest debts paid, and private extravagance has led to public extravagance which threatens to bankrupt the country."

The latter part of the judge's criticism was, we feel sure, not his original thought, but a reflection from his copy of *Collier's Weekly*. For that otherwise excellent exponent of truth has published an article by Edith Brown Kirkwood on that very subject.

This lady discloses in a startling way how she determined to cut down the $15 a week grocery bill of her family as it grew up under the ministrations of the telephone system, and she did it by going in person to buy her meats and groceries, by paying cash for them and by lugging them home herself.

She found that under the convenience system, through the use of the telephone, she had paid 90 cents for a shank of ham, and two weeks later, when she went after it herself, she got as good a one and of the same weight, for 48 cents.

She found also that when buying in person and on the spot she never suffered from overcharges or underweights. She stood by and saw the article weighed. She was not subjected to the annoyance of ordering an article of a certain quality, and quantity and price, only to have something of another quality, quantity and price delivered to her after it was too late to send it back for correction. She found this mighty economical especially in the purchase of meat cuts and vegetables.

Generally speaking, she found food commodities from 5 to 100 per cent cheaper when purchased in person at the market than when ordered over the telephone for delivery. As a result she was able to cut the allowance for family groceries from $15 to $10 a week and after a year of the latter she had determined her family had had better food than under the telephone plan, and that it had had at least the same quantity for $10 that it had previously had for $15.

As if this were not enough, we have the case of the indiscreet Berlin lawyer who was adjudged guilty of slandering the postoffice administration, which controls the telephone system under the Teutonic polity. The particular offense of this Berlin attorney was that he called telephone girls "camels" and "sheep." The culprit's defense was that telephone operators delight to torture the victim at the end of the wire; one day he had called a number nine times within three-quarters of an hour and each time had received the tantalizing answer that "the wire is busy"; complaining then to the central manager he learned that his connection had been free all the while. The court's medical expert testified after an examination of the defendant that the latter was of a highly nervous temperament, and that there were cases of men who had gone insane from telephonic vexation (Telephonärger), but that nevertheless he had not as yet passed the state of legal responsibility. He was fined 260 marks ($65).

Still good humored even after considering this mass of unfavorable evidence, we protest that good argument were better expended in some other direction than in answering these wordy but ill-considered knocks against the greatest of utilities. Telephonärger could not exist in this country. The greatest imaginable telephone vexation is as balm to the soul compared to the terrible, devasting vexation of no telephone at all.

As to the extravagance of marketing by telephone, we editorialized on that subject a few numbers ago, and are too modest to repeat ourselves. The lady simply did not know how to shop by telephone, and refused to learn. Her testimony is but one human opinion, against which, we wager, we could set volumes of contrary testimony.

And that other charge of the worthy judge is manifestly unfair. The same might be said of a knothole in the fence. Perhaps he would advocate that every operator be appointed official chaperone.

The telephone is still serene.

IN FIFTEEN YEARS.

TWO million telephones are in farm houses in the United States. Such is the statistical statement of the telephone census.

It is pretty hard to realize just what this has meant and means. This sewing together of neighborhoods and homes has been done within the past dozen years, practically within a decade.

It means that the farm has been moved up to the city or the city brought to the farm so far as communication goes. It means that several million women who twenty years ago would have been marooned in farm houses six days out of the week have had their lives and interest broadened to the limit of the telephone line that neighborhoods have been organized into communities and that homes have been moved up against each other. The telephone is the voice, a still, small, far-reaching voice which speaks across farms and over states. The family on the secluded cross roads is no longer sequestered. Its whisper reaches to the confines of a county.

The great difference between farm life twenty years ago and today has come about by the telephone and other new methods of intercommunication. The inventor and discoverer and organizer are entitled to vast credit and gratitude. The organization of the mail routes which bring with them world citizenship, the invention and perfection of the motor car which changed miles to rods, these and the telephone have not changed men and women but have afforded them opportunity to develop. They are opportunities to progress.

Fifteen years ago there were scarcely a dozen free rural routes in the state. The communities were not

infrequent which looked upon the free delivery route as a thing not to be desired. Individual farmers were plenty as blackberries, in a pasture who saw the plan as an added and unnecessary expense. At that time farm telephones were practically unknown. Like the mail route they were by many considered undesirable. And in fifteen years so great is the change that a free delivery route is a necessity and a telephone imperative.

TO ENCOURAGE TOLL CALLS.

A POSSIBLE means of encouraging people to make toll calls is by grouping the exchanges included in a directory, so as to have available without special inquiry, the lists of those places most likely to be called, thus facilitating calling by number and making the call seem like a local one.

When a territory is divided up for directory purposes into large sections, containing none of those places which may be adjoining but within another section, and subscribers are supplied only with the directory of their own section, the subscribers in towns located near the boundary are unable to find, in their own directory, the telephone numbers of subscribers in nearby or adjoining towns. In this case the calling party, unless the number of the desired party is already known, has to give the detail of the call to the recording operator who, if she has a directory of the adjacent section, will look up the number and pass the call. Otherwise the recording operator is obliged to pass the entire information to the operator at the desired exchange, who then looks up the number and completes the call. This consumes a large amount of time not only on the part of the calling party in giving the detail but also on the operators and circuits involved in completing the call, thus slowing down the service. Because of this delay, people are liable to receive the impression that the making of a toll connection is an onerous task and as they dislike to go to so much inconvenience, the call is lost. In the case of an exchange near the corner of a directory section, conditions are likely to be such that a number of nearby towns with which a large proportion of the business is done are not listed, the directory being taken up with places either remote or with which little business is done. As a result a considerable percentage of the toll calls cannot be passed by number.

The person wishing to make the call may not even know whether the desired party has a telephone, and making this information more accessible certainly tends to encourage the call. In fact, this information sometimes furnishes the impulse for making the call. One occasionally hears the remark, "Why, So-and-So has a telephone, I must call her up."

If the sections covered by one directory are large, a needless amount of expense would be incurred by supplying the subscribers in the towns on the border of a section with the directory of the adjacent section, as only a small portion of each would be much used. Instead of this, the suggestion is made that the towns within a radius of perhaps 35 miles of the larger cities or towns be included in the directories furnished to the subscribers in those places even if some places came in two or more directories. Then either the local or two number toll method of operating, which involve calling by number, might be put into effect and this would greatly increase the speed and ease with which calls could be made. Since the calling party, with either of the above methods in use, remains at his telephone just as in a local call, one of the possible annoyances of a toll call would be removed and to the subscriber the operation woud seem as simple as in making a local call.

It is believed that in such cases as described by adopting the above plan the making of toll calls will be greatly facilitated and encouraged and the reductance diminished.

SEMI-AUTOMATIC IN GERMANY.

THE city of Posen in Germany has the first semi-automatic telephone system which is under the direct supervision of the German Imperial Postoffice Department. The exchange has about 4,000 connections and uses the Siemens-Halske system. The operation is somewhat as follows: When the subscriber lifts his receiver, the pre-selector begins to move as is the case in all automatic systems and come to a stop at the first open group selector. For every group selector there is a corresponding 25 part trunk selector, which begins to move as soon as a first selector has reached an open group selector, and moves until it finds an open operator. The operator presses a key, and after receiving the desired number presses the keys corresponding to the number wanted. In other words it is the operator and not the subscriber who presses the keys and moves the dials for the proper numbers. The distribution of calls at the exchange is such that all operators receive calls on the first row of keys, and the second rows of keys are used only if there are more calls coming in at one time than can be answered at the time. If there are more calls than even the second keys allow, the extra calls are automatically switched to a special control field and have to wait there until some of the operators' fields are open for more calls, when they are transferred automatically to the operators.

The actual operating results are of special interest, as the distribution of calls to the different operators has been registered and plotted on charts for later study. As standard the department has taken the answering of 450 calls per hour. About 40,300 connections are made per day, of which about 6,800 are busy answers and 4,000 are calls that lead to no final connections, as the subscribers are either busy or do not answer. Although the different thousand groups are fairly evenly utilized through the use of the intermediate distributer, there are differences in load. The economy of the operation depends on the size of the groups and only larger groups can obtain very economic and even loads. In Posen it was possible to dispense with one entire set of operators after introducing the 25 section or part trunk selectors. The use of these sets which permit a subscriber to reach any operator have also reduced the waiting time for subscribers. Among more than 1,000 calls, 73.3 per cent were finished in less than 10 seconds. The time between ringing a called subscriber and the latter's removing his receiver was less than 5 seconds in more than 50 per cent of the calls, and less than six seconds in about 74 per cent of the cases. As regards the busy time of operators, i. e., the time between lighting of call lamps and pressing down of keys, it is 2,854 sec. per hour or $\frac{2,854}{3,600} = 0.79$. The operator uses on an average about 6.21 seconds to make a connection, consequently with 450 calls per hour we have the average busy time equal to 0.77 and with 500 calls equal to 0.86. It was shown that 450 calls per hour can be called a fair hour's work and that 500 connections can also be made without trouble for a short time in the day. It is not advisable to make greater demands on the operators, and if there should be more calls, the super-

visors can help answering calls which they can easily do by switching their boards into the lines. The average length of telephone conversations is about 1.7 minutes. For trouble, repairs and cleaning, there are 1.3 mechanics per 1,000 subscribers' lines, 1.3 helpers for cleaning the connections, and instruments in the exchange and at the subscribers' places.—*Telegr. u. Fernsprechtechn.*

AS TO TELEPHONES IN CHINA.

There is a telephone service operated at Hankow by the German post office in the foreign concessions and a Chinese telephone service in the native city. The Chinese telephone service connects with the neighboring cities of Wuchang and Hanyang, says the report of Consul General Roger S. Greene, of Hankow.

In Changsha, the capital of Hunan Province, there is a telephone system, though it is little used by private persons.

In Kiukiang there is no electric-light plant. In Nanchang there is a small electric-light plant. In both cities there are telephones, but no system that is in general use with any considerable number of subscribers.

It would be exceedingly difficult, if not impossible, for a foreign company to get any public-service franchise, and the number of Chinese merchants with whom a joint Chinese-foreign enterprise could be conducted is still very small.

A peculiar accident is reported from the Stralsund (Germany) telephone exchange. Three operators received powerful shocks, that resulted in nervous trouble, laid them up for a long time, and interrupted service temporarily. It is not a case of direct crossing of high and low tension wires, but a case of influence of high on low tension lines. It seems that a high tension line is spanned above a telephone for some distance and the inductive effect caused the trouble.

At Dinnington Main colliery, in the South Yorkshire, England, coal area, interesting experiments are being conducted with wireless telephony. An installation is being fitted up in the pit and on the surface, and it is claimed that the system, invented by a German scientist, makes it possible to converse through 1,500 yards of solid rock.

Communication has been established between London and Germany over the new loaded submarine cable, which has been laid from St. Margaret's Bay to La Panne, in Belgium. The distance from London to Aix-la-Chapelle (over which one conversation took place), via Brussels and Cologne, is about 320 miles.

The three great liners of about 50,000 tons each, which have been ordered by the Hamburg-America line, are going to be fitted out with telephone exchanges of the most modern type, to which each cabin will be connected. The order for the installation has been given to Messrs. Siemens & Halske, of Berlin.

Recommendations for the more extended use of the telephone have been issued by Mr. T. Buckley, chief electrician of the New Zealand Post and Telegraph Department, Wellington, N. Z. He also recommends the installation of an automatic system for several of the chief cities of the country.

A Lot of Loaded Lines

THE TELEPHONE ALPHABET

By MISS M. M. BURNS, in *The Transmitter.*

A stands for "Answer," which should never be slow.
B is for "Busy," as you all well do know.
C for "Complaint," only a few we receive.
D is "Don't Answer," which folks think "make-believe."
E for "Excelsior," our motto most true.
F is for "Faithful," our service to you.
G is for "Gratitude," appreciation kind.
H for the "Happiness" we daily find.
I "In" the Telephone Company, hour by hour.
J stands for "Jacks"—they're of wonderful power.
K for their "Kinds," which are two-fold, we learn.
L for the "Lamps," which so frequently burn.
M is for "Message Rates," and "Money" as well.
N is for "Noisy," as trunk tests will tell.
O that's "Out of Order," and likewise "O. K."
P the "Payments" on anniversary day.
Q stands for "Queries," 'tis subscribers' delight.
R the "Responses," given promptly and right.
S stands for "Subscribers" and good "Service," too.
T is for "*Transmitter,*" our fortnightly review.
U is for "Underlining," red, brown and white.
V is to "Verify" our statements are right.
W for "Wire"—a 'phone need in ev'ry clime.
X stands for "Xd" (crossed), how the lines are sometime
Y shows one party, on a line that has two.
Z means "Zealous" co-operation with *you.*

ONE REASON WHY INVENTORS CLAMOR FOR NEW PATENT OFFICE REGULATIONS.

[Statement by a United States Patent Office Examiner.]

As stated in the record it would be perfectly obvious to any mechanic that a right handed drill would be used to extract a left handed screw and a left handed drill to extract a right handed screw.

SUCH A LONG-WINDED BEAST.

[From a hunting tale in the London *Standard.*]

The tiger came toward me, bellowing and grunting, and when he got opposite the screen he gave one of those fearful coughs which only a man who has been close to such a beast can appreciate. It was eleven feet long.

THE HEIGHT OF ACCOMMODATION.

[From an electric vehicle advertisement.]

If the Edison nickel-steel battery or the Ironclad Exide is desired, neither will be furnished.

RURAL ACTIVITIES OF OUR INDUSTRY.

[From the *M. I. T. A. Message.*]

Askoy, Minn.—The Tri-State Telephone company will soon begin the rearrangement of the wires around the town.

Sunburg, Minn.—(R. F. D. from Kerkhoven)—The stockholders of the telephone company of this place have voted to run the line from one of the farmers to Hallberg switch.

In England, now, they are not so ready to discard equipment just because it is old. Indeed, it would seem that some of the antique pieces are required to do extraordinary duty. In a recent paper Mr. T. Campbell Futers stated that "the first steam turbine was introduced by the Hon. (now Sir) C. A. Parsons in 1884 for the purpose of generating electricity, and is at the present day fitted to some of the largest liners and war vessels for ship propulsion." P. H. W.

The Gulf of Georgia Submarine Cable

By E. P. La Belle and L. P. Crim*

THE recent laying of a continuously loaded submarine telephone cable, across the Gulf of Georgia, between Point Grey, near Vancouver, and Nanaimo, on Vancouver Island, in British Columbia, is of interest as it is the only cable of its type in use outside of Europe.

The purpose of this cable was to provide such telephonic facilities to Vancouver Island that the speaking range could be extended from any point on the Island to Vancouver, and other principal towns on the mainland in the territory served by the British Columbia Telephone Company.

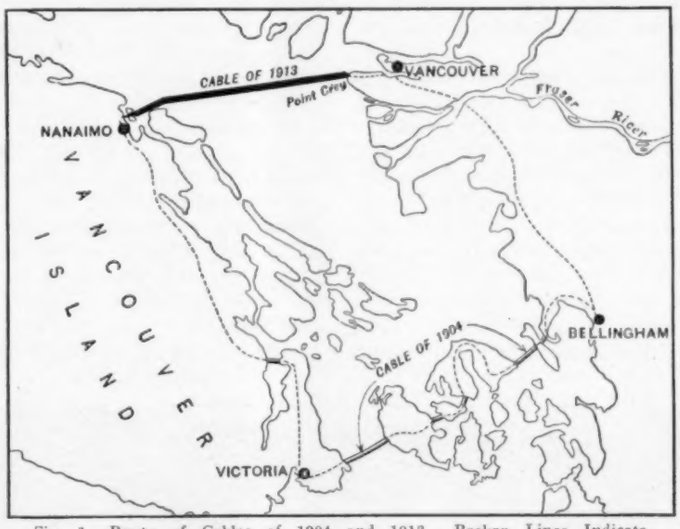

Fig. 1.—Route of Cables of 1904 and 1913. Broken Lines Indicate Aerial Land Lines.

The only means of telephonic communication between Vancouver and Victoria, prior to the laying of this cable, was through a submarine cable between Bellingham and Victoria, laid in 1904. This cable was non-loaded, of the four-core type, with gutta-percha insulation, and to the writer's best knowledge, is the only cable of this type in use in North America. This cable is in five pieces crossing the various channels between Bellingham and Victoria. A total of 14.2 nautical miles (1637 miles, 26.3 km.) of this cable is in use. The conductors are stranded and weigh 180 lbs. per nautical mile (44.3 kg. per km.). By means of a circuit which could be provided through this cable by way of Bellingham, a fairly satisfactory service was maintained between Vancouver and Victoria, the circuit equating to about 26 miles (41.8 km.) of standard cable. All communications to points on Vancouver Island north of Victoria were routed through this cable circuit. As a consequence the speaking range from Vancouver to the island was limited to a few points near Victoria, and Nanaimo was the extreme limit of commercial service, and conversation was not attempted except under the most favorable conditions. Under some conditions conversation was possible except for the distorting effect of the unloaded cable.

By using the new cable, Nanaimo is made the center of distribution for Vancouver Island. The longest line that will ever be connected at Nanaimo will extend to the north end of Vancouver Island, and will be about 250 miles (400 km.) in length, so it can readily be seen that satisfactory service may be established to any point on Vancouver Island through the new cable. It was with the idea in mind of using Nanaimo as the distributing center that the existing route was chosen for laying the cable.

It is quite important to the long life of a submarine cable that a rock bottom and exposure to tidal currents be avoided as much as possible. It is also quite essential that the shore ends be landed in mud or sand and that they be kept buried, at least as far as the low water line. It is believed that the route chosen will prove to be very satisfactory.

Fig. 2.—Details of Cable Construction.

The new cable was manufactured by the Henry Telegraph Works, in England, and has the following mechanical properties:

Conductors.—Four conductors, each consisting of a central wire, surrounded by twelve wires of annealed copper, having a total weight of 300 lbs. per nautical mile (73.4 kg. per km.); total diameter of conductor 0.1385 in. (3.518 mm.).

Loading.—One soft iron wire 0.012 in. (0.305 mm.) in diameter, wound round the conductor and having seventy turns per inch (27.6 turns per cm.).

Dielectric.—Three coats of best gutta-percha alternating with three coats of Chatterton's compound. Total weight of dielectric per nautical mile 300 lbs. (73.4 kg. per km.). Diameter over gutta-percha 0.409 in. (1.04 cm.).

Cabling.—Four cores laid around a yarn center, wormed, brass taped and served with yarn.

Armoring.—Fifteen galvanized steel wires each 0.192 in. (0.487 cm.) in diameter, separately tarred and served with tarred yarn.

Outer Serving.—Two coats of tarred yarn, and two coats of preservative compound.

Diameter.—Diameter of completed cable 1.956 in. (4.97 cm.).

Weight.—Weight of completed cable, eight English tons per nautical mile (4.38 metric tons per km.).

The same type of armoring was used throughout, and on account of the armor

*Paper presented at the 285th meeting of the American Institute of Electrical Engineers, Vancouver, B. C., September 9-11, 1913.

wires each being served with tarred jute, the completed cable was very flexible.

The cable has electrical qualities as shown in Table I, measured on 31.3 nautical miles (58 km.) of the completed cable in the factory at a temperature of 75 deg. fahr. (24 deg. cent.). All quantities per nautical mile.

The values of Table II were obtained by an eminent independent testing authority on a length of one-twentieth of a nautical mile cut from the completed cable. Results are per nautical mile, and tests were made with sinusoidal current at a frequency of 800 cycles per second, at a temperature of 56 deg. fahr. (13 deg. cent.).

The results of Table III were obtained in the laboratory of the manufacturers on the completed length of 31 nautical miles (58.5 km.) coiled up in the iron tank and covered with water, using sinusoidal current at 800 cycles per second, as before.

After laying, the cable was tested for dielectric resistance, for capacity, and for conductor resistance. The transmission equivalent was measured in terms of standard cable and tests were made for crosstalks. (See Table IV.)

The above results are per nautical mile. Dielectric resistance is corrected to 75 deg. fahr. (24 deg. cent.).

The actual length of cable in use is 28.3 nautical miles (52.5 km.) and its mean temperature was 49.6 deg. fahr. (9.8 deg. cent.) at the time the measurements were taken. Speech tests showed a standard cable equivalent of eight miles with zero loop on each end, and 5.75 miles, with 12 miles of standard cable at each end to reduce reflection losses.

Fig. 3.—Coiling of Cable in Hold of Princess Louise.

The finished cable was shipped from England to Vancouver on the ship *Crown of Galicia*. It was stored in a steel tank while on shipboard and kept under water. The temperature was observed daily throughout the voyage. Upon arrival at Vancouver, it was transferred from the tank in the hold of the *Crown of Galicia* to the hold of the barge *Princess Louise*, from which it was later laid. The actual operation of laying was begun at the Point Grey end at 4 a. m. June 16th, and finished at Kanaka Bay on New Castle Island at 7:30 the evening of the same day. The illustrations herewith show the laying operations in detail. Throughout the entire operation of laying, one pair was under continuous test for insulation resistance, while the other pair was being utilized for communication with the shore. As a matter of precaution the two pairs were interchanged at intervals so that no fault in the dielectric could escape observation for any length of time. While the cable was being laid, conversations were carried on with parties in Vancouver, Victoria, Seattle and Portland. Two tugs were used to tow the cable ship, which was without power of its own. Telephonic communication was maintained with the tugs by means of rubber covered wires strung on the hawser. Observations to determine the location were taken at regular intervals with a sector, and a log of operations was carefully kept. The tension on the cable was observed by means of a dynamometer, and the amount of cable paid out was read from the rolometer attached to the paying-out drums. With the exception of a light rain in the morning, the weather was excellent, and a number of guests observed the laying operations, which were without accident.

A cable hut is provided at each of the shore ends for housing the protective apparatus and making the connections between the cable and the aerial land lines. The protective apparatus is of the Lodge-Muirhead type, and consists of three reactive coils with four discharge points, located around a central brass disk, which is grounded to the armor wires of the cable. Each of the cable cores is laid through a protector of this type, and a fuse is inserted between the protector and the line wire, and also between the protector and the cable. All of the protective apparatus is housed in a waterproof cast iron case.

The two physical circuits provided in this cable were satisfactory in every way and are each equivalent to about 5.75 miles of standard cable. The phantom circuit, however, is not so satisfactory. It is only fair to the manufacturers, however, to state that a satisfactory phantom circuit was not guaranteed. It will be seen that the capacity and leakance of the phantom circuit is just two times as great as in the physical circuits, while the resistance and inductance are about one-half each. This causes the attenuation constant of the phantom to be somewhat greater than that of the physical circuits. There is also some crosstalk between the physical circuits and the phantom, being equivalent to about 75 miles (120 km.) of standard cable. Tests for this determination were made with local battery sets in the cable huts connected directly to the ends of the cable. This crosstalk is undoubtedly caused by inductive unbalance in the cable. On account of the salt water penetrating to the outside core of the gutta-percha, the wires are shielded from each other electrically. Any disturbance that is transmitted from one wire to another must therefore be of an electromagnetic nature. The capacity of the cores in this type of cable depends upon the thickness of the dielectric, and in every case is the capacity from the wire to the ground (salt water), as the sea water penetrates the cable to the gutta-percha. Efforts to decrease the capacity of this type of cable by a paper wrapping under the gutta-percha, in order to increase economically the diameter, have failed

because of the moisture content of the gutta-percha being absorbed by the paper.

The uniformity of the capacity then depends upon the cores being exactly of the same dimensions and located symmetrically. It can readily be seen that a slight eccentricity of conductor in the dielectric will change the capacity accordingly.

The inductance of these cable circuits is artificially increased by a winding of soft iron wire around the copper conductor, which increases the permeability of its magnetic field. This is the well-known Krarup system of continuous loading. The permeability of this wire may be affected in three ways, namely, aging, by straining it beyond its elastic limit, and by permanently magnetizing it. Aging occurs in nearly all iron used in magnetic circuits and the magnitude of the change of permeability varies with the different pieces of iron. It is thus possible that the inductance of the different cores of a Krarup cable might be thrown out of balance by the iron wires aging differently. It is known that the permeability of magnetic iron is affected by straining it beyond its elastic limit. When it is considered that the leading wire is only 0.012 in. (0.305 mm.) in diameter, and that in order to hold it around the copper conductor so that it will remain evenly distributed, it is necessary to apply it with considerable tension, it is more than likely that a considerable amount of this wire has been heavily strained. This is indicated by its appearance. During manufacture the different sections of core were spliced together in such a way as to neutralize as far as possible any unbalances that could be detected at that time. It will be seen that the total capacities and inductances of the different cores are in a fair degree of balance. There is very little danger of the iron wrapping used in continuous loading ever becoming permanently magnetized, as this would require a very heavy current.

Fig. 4.—Cable in Tank on Board Crown of Galicia.

It is customary to measure the direct-current insulation resistance of a gutta-percha core at 75 deg. fahr. (24 deg. cent.) and after one minute's electrification. The insulation resistance increases quite rapidly after the initial electrification and only reaches a fairly constant state after some time. This effect, although not well understood, seems to be somewhat similar to the polarization effect of an electrolytic couple. The dielectric resistance so obtained cannot be used to deduce the leakance S for calculating the attenuation constant and circuit impedance. Measurements for this quantity must be made at telephonic frequencies and voltage, and owing to the extremely small quantity of power involved, are exceedingly difficult to make with any degree of precision.

Gutta-percha is rarely employed as an insulator for telephone conductors, with the exception of submarine cables in deep water. While information regarding its various characteristics is not very plentiful, a brief statement of its qualities may be of interest.

It is composed of pure gutta, rosin and water. It is a vegetable gum secured from certain tropical trees very much the same as India rubber. It is collected by native labor, and shipped in the raw state to the factory where it is prepared for commercial use. The first step in its preparation is to remove all impurities, as far as possible, which is done by boiling in water. It is then put through a masticating machine, after which it is rolled out into thin sheets.

The wire which is to be insulated with gutta-percha is first given a coat of Chatterton's compound, and then a coat of gutta-percha is applied with a sheathing machine, in much the same manner as lead sheaths are applied to the ordinary paper-insulated telephone cable. Additional layers are applied alternating with layers of Chatterton's compound, until the required thickness of dielectric has been obtained. It should be noted that gutta-percha is not subjected to any process similar to the vulcanization of rubber, but is used in the raw state. It contains no sulphur, and copper wires do not require tinning before being insulated with gutta-percha.

In general, rosin does not increase the initial insulation resistance of gutta-percha, but if it is present in too great proportions it tends to separate, especially upon exposure to heat and light, and causes cracks to form in the insulation. Ordinary grades contain from five to six per cent moisture. The insulation resistance increases very rapidly with a decrease in temperature, so that at 45 deg. fahr. (7.2 deg. cent.) its insulation resistance is about ten times that at 75 deg. fahr. (24 deg. cent.). If it is heated much above 80 deg. fahr. (27 deg. cent.) it soon softens, and in a completed cable this would allow the cores to become deformed, especially if the cable were subjected to any considerable pressure, such as the lower coils in a cable tank. Instances have been known where the copper conductor by its own weight became so eccentric in the core that a large quantity of the cable was ruined on account of the insulation becoming too thin.

Generally speaking if different grades of gutta-percha are mixed together, a higher dielectric resistance is obtained, but the fibrous structure is not so good as if one quality were used throughout.

The splicing of a gutta-percha-insulated conductor is one requiring no little skill and care. It is necessary in splicing a four-core cable that the spliced conductors be of equal length, so that no one splice will be subjected to more than normal stress. In splicing the conductors, the ends are scarfed and soldered together. Then the joint is given a close wrapping of fine copper wire, which is also soldered all over. A second wrapping of fine copper wire is then applied in reverse direction and soldered only at the ends. In case the joint was so strained as to break the soldering in the main conductor of the first wrapping copper wire, this last spiral wrapping would still form a metallic connection across the break. In joining the dielectric, the same number of layers of gutta-percha

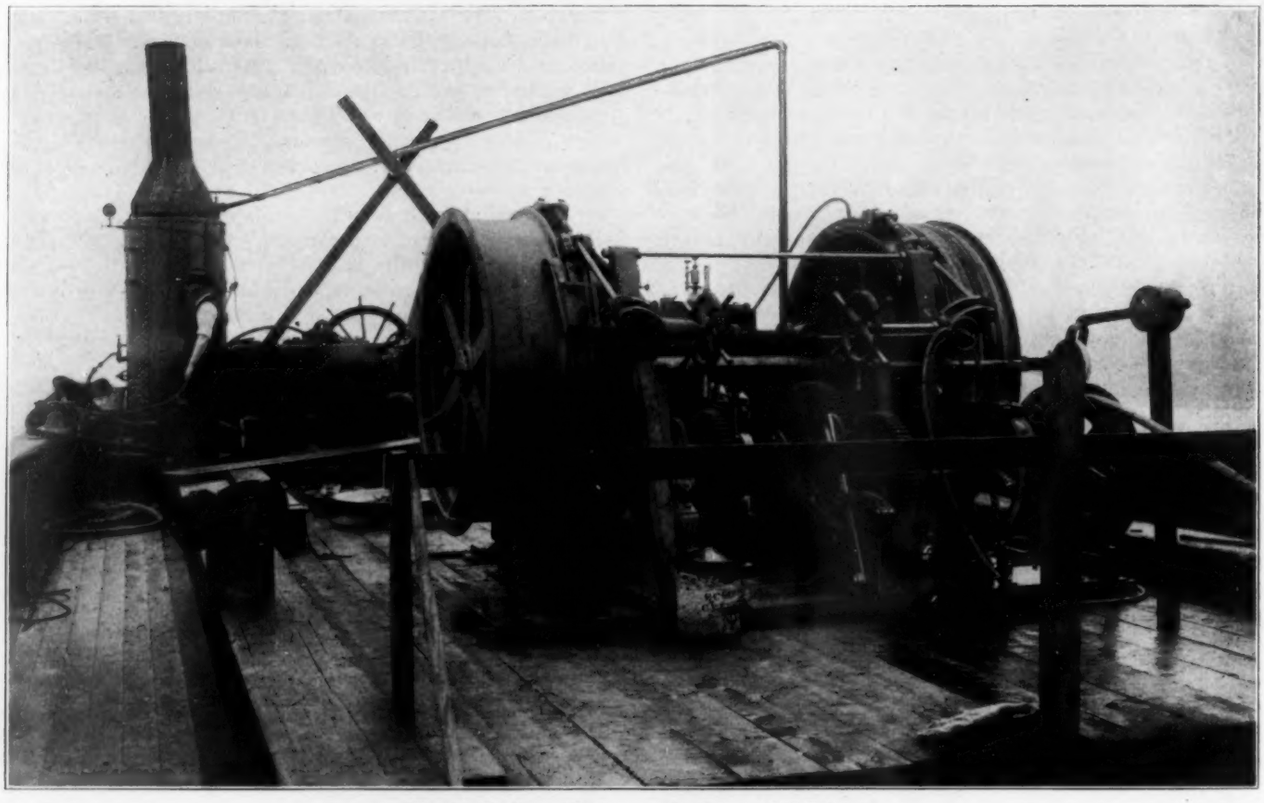

Fig. 5.—Paying-out Drums on the Crown of Galicia.

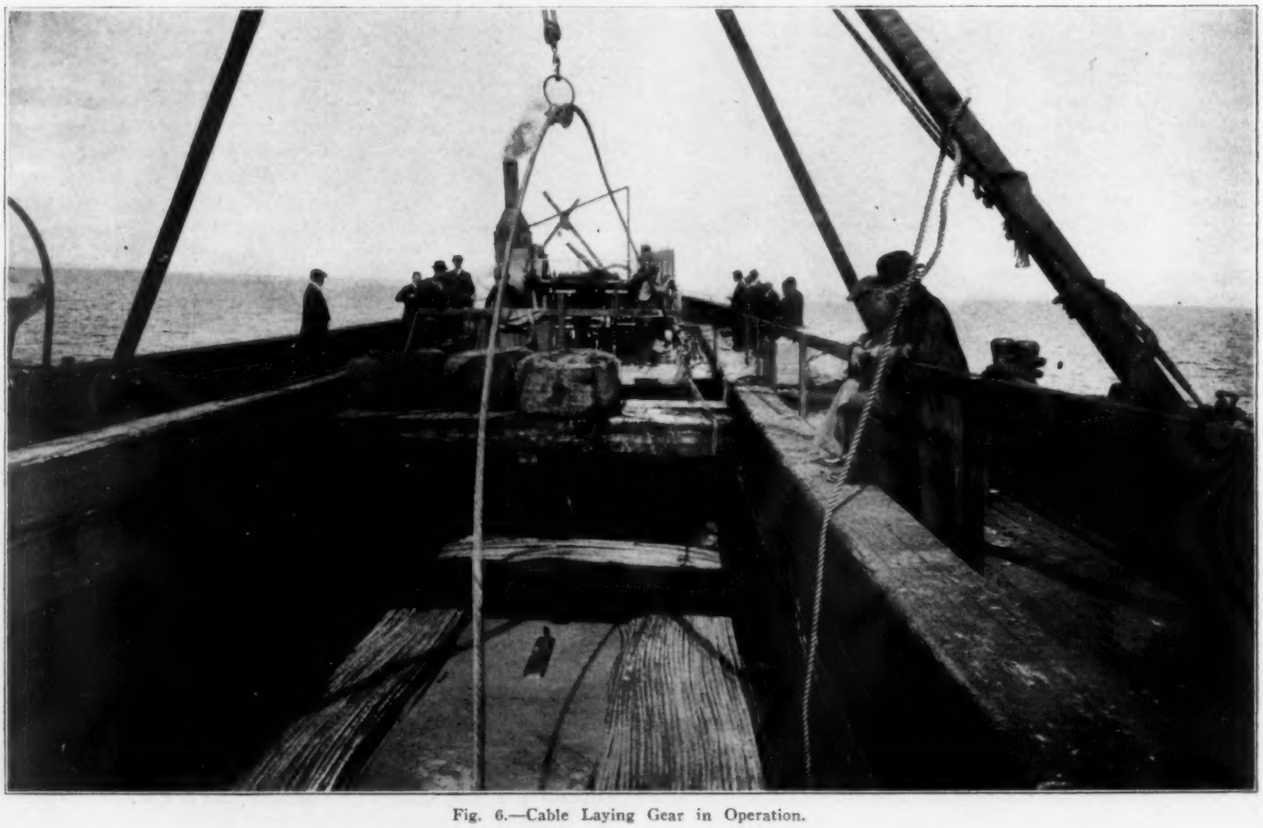

Fig. 6.—Cable Laying Gear in Operation.

are applied, alternating with Chatterton's compound, as are used in the manufacture of the core. The gutta-percha is warmed with a spirit lamp until plastic, and is applied with the fingers. The finished splice must not have a much greater diameter than the unspliced core and must show leakance not in excess of a piece of core ten times the length of the splice. Owing to the inability of gutta-percha to stand exposure to moderately high temperature, light and air, it has been the practice among European engineers to splice a piece of rubber-insulated cable on to the gutta-percha below the water level at the shore ends, and thus make the landing with rubber-insulated cable. As it is well nigh impossible to make a perfect splice between rubber and gutta-percha, it is necessary to employ a water-tight junction box if this method of terminating the shore ends is used. No method has yet been found for cementing rubber and gutta-percha together so that the joint will hold for any appreciable length of time. The practice of using rubber insulation for the shore ends was not followed in laying the Point Grey-Nanaimo cable, for the above reasons. The shore ends have been buried from the terminal in the cable hut to low water, and on account of this, will not be exposed to temperature very much above that of the sea water. Sufficient slack has been left in the cable so that in case the ends at the terminals lose their insulating qualities, they may be cut off and the cable reterminated. In this way the ends of the cable may be kept in excellent condition by allowing a few feet extra for the cable reterminating.

In a four-core cable such as is generally used for telephone purposes in deep water, the two opposite cores are used to form each circuit. It is not necessary, if the cores are arranged symmetrically about the center, that the wires be twisted in pairs in order that each circuit will be unaffected by the current flowing in the other. The wires of one circuit do not inter-loop the lines of magnetic force from the other, and each of the wires is under the influence of equal and opposite electrostatic fields. This latter is not true of a cable submerged in salt water, due to the shielding effect of the salt water. As mentioned before, it will therefore be seen that the two circuits are quite independent of each other both electromagnetically and electrostatically. The same thing is true of the superimposed or phantom circuit, but the results obtained in practice are not so good as with the two physical circuits.

In selecting a design of cable suitable for this service, the choice was practically limited to a four-core gutta-percha cable, loaded either by the continuous or Krarup system, or by the use of Pupin coals. Owing to the depth of water (1,300 feet. = 396 meters) a paper-insulated lead-covered cable was not seriously considered. The stress during the laying would so strain the cable in passing over the drums and sheaves that there would be great danger of impairing the insulation between the wires. Owing to the highly distortional effect of non-loaded gutta-percha cable, it was necessary to eliminate such a cable from consideration. It remained, therefore, to choose between the two types of loading. It is well known that a coil-loaded cable is quite superior to a con-

TABLE I.

	Conductor resistance Ohms	Electrostatic capacity Microfarad	Dielectric resistance* Megohms
No. 1 Core	4.004	0.3449	258
No. 2 Core	4.004	0.3455	256
No. 3 Core	4.004	0.3449	268
No. 4 Core	4.005	0.3449	274

*After one minute's electrification.

PER NAUTICAL MILE OF LOOPED CIRCUIT.

	Cores	Conductor resistance Ohms	Electrostatic capacity Microfarad
Circuit A	1 and 3	8.008	0.1724
Circuit B	2 and 4	8.009	0.1726
Superimposed or phantom circuit on A and B		4.0045	0.3450

TABLE II.

Column A, loop or side circuit cores 1 and 3
Column B, loop or side circuit cores 2 and 4
Column C, superimposed or phantom circuit.

	A	B	C	
Effective resistance R	9.16	9.14	4.69	ohms
Effective inductance L	11.56	11.54	5.45	millihenrys
Effective capacity K	0.1647	0.1662	0.3338	microfarad
Effective leakage S	12.24	11.26	19.84	microhms
Ratio S/K	74.3	67.8	59.4	
Attenuation constant	0.01892	0.01874	0.01966	

TABLE III.

Circuit	A	B	
Open impedance Zo	349.35	337.4	Vector ohms
	∖32°31′	∖33°54′	angle
Closed impedance Zc	185.75	187.5	Vector ohms
	∖23°5[illegible]	∖24°43′	angle
Characteristic impedance Z	254.5	251.4	Vector ohms
	∖4°19′	∖4°56′	angle
Attenuation constant	0.01946	0.01940	

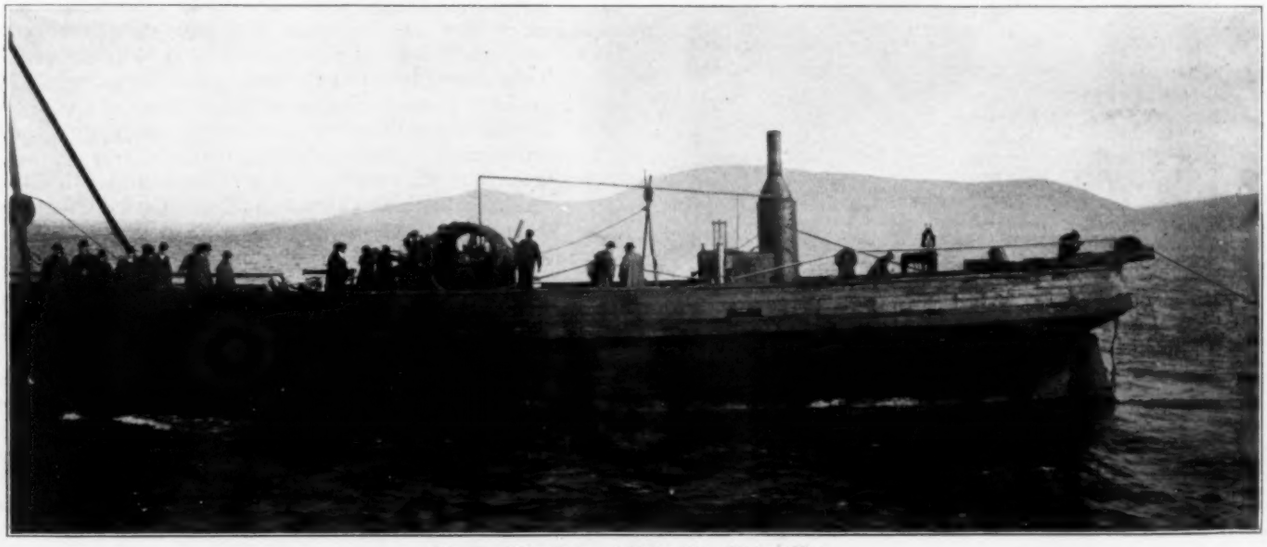

Fig. 7.—Side View of Cable Ship Under Way.

tinuously loaded cable, or in fact any other design of cable, when electrical qualities alone are considered. The continuously loaded cable is mechanically quite simple and upon its completion is equally as strong as a non-loaded cable such as has been used for telegraph service for years, even at the maximum depth of the ocean. In a coil-loaded cable the only acceptable design of coil so far employed is one which surrounds the four cores of the cable, and which is taken inside the regular cable armor. This causes an increase in the diameter of the cable from two to three times its unloaded diameter, and in spite of precautions which may be taken in the manufacture, these loaded points are the weakest spots in the cable, both electrically and mechanically.

The two best known examples of coil-loaded submarine cable extend from England to France across the English Channel, and from England to Belgium. The former cable is about 20 nautical miles (37.1 km.) in length, and the latter about 40 nautical miles (74.2 km.) in length. Neither of these cables is laid in a very great depth of water, and both are under the supervision of the British Post Office, which has available cable ships especially designed for the laying and repairing of such cables. The older of these cables has only been in use about three years, and during this time no serious case of trouble has developed, so that the actual difficulties to be encountered in repairing this type of cable can only be forecasted in view of experience in preparing the non-loaded type.

In order to keep the transmission in a coil-loaded cable at its original quality, it is necessary that the spacing of the coils be kept as originally laid out, allowing only a variation of five per cent. It is quite obvious that this is not true of the continuously loaded type, and any increase in the length would cause an increase in the transmission loss, only in proportion to the increased length of the cable employed.

In case of a fault in deep water, the cable is picked

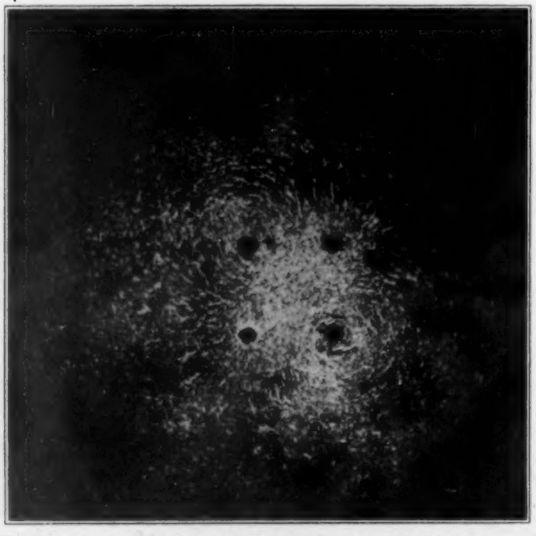

Fig. 8.—Distribution of Magnetic Flux in Four-Core Cable, Current Flowing in Physical Circuit Only.

up by means of a grapnel and as soon as it is brought to the surface it must be cut in order to relieve the great strain. One end is retained in the grapnel and a line is made fast to the other end which is thrown overboard and a buoy attached. The end which is retained is tested for the fault, and unless the fault is in the cable which was thrown overboard, the cable is picked up until the fault is located and repaired. It is then necessary to splice in a piece of new cable and pay out until the abandoned end is picked up, when as much slack as possible is taken out and the two ends spliced together. It will thus be seen that a considerable additional length of cable

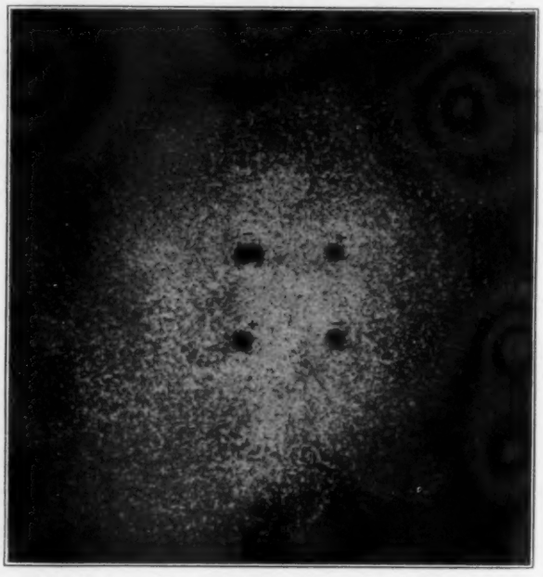

Fig. 9.—Distribution of Magnetic Flux in Four-Core Cable, Current Flowing in Phantom Circuit.

will be introduced in case of a fault in very deep water. In case such a repair was made at a depth of 1,300 ft. (396 m.), under the most favorable conditions, it is quite probable that 800 to 1,000 ft. (244 to 305 m.) of additional cable would be introduced. As 300 ft. (91 m.) is the greatest allowable variation with coils spaced one nautical mile (1.854 km.) apart, it will be seen that the coil spacing would be badly disarranged and serious reflection losses introduced. It must also be remembered that no gutta-percha cable is manufactured in America and the only submarine loading coils so far manufactured have been made in Europe, and in case expensive repairs were necessitated, it might be necessary to secure special equipment and skilled labor from Europe, while with the type adopted, repairs can be made with the equipment and labor commonly used in repairing telegraph cables.

Comparisons between the two types of loading have been made and much discussed by different authorities, and a comparatively recent paper on this subject by J. G. Hill summarizes arguments in favor of the two types in a very excellent manner. It is a well known fact that the two types of cable having the same transmission efficiency may be produced, the coil-loaded cable at much less expense than the continuously loaded cable. Mr. Hill bases his comparison on two factors; one, that inductance can be added by the continuous method of loading only up to a certain limit, say 20 millihenrys, while by coil-loading, any desired amount of inductance may be added to the circuit; and second, that the ratio R/L, obtainable with the coil-loaded cable, is much less than that obtained in continuous loading. The limit of economic loading depends upon the amount of resistance added to the circuit in increasing its inductance.

The attenuation constant of a cable is unfavorably affected by the addition of resistance. All known methods of increasing the inductance of a circuit, also increase the

effective ohmic resistance, and Mr. Hill compares the efficieny of the added inductance in terms of the amount of resistance so added. It has been found that the ratio between the added resistance and the added inductance for continuous loading is about 110, while a good design of loading coil has a ratio of R/L of about 60. These ratios are true only for the amount of inductance used in ordinary practice. The increase in effective resistance, as is well known, is due to the eddy currents and hysteresis losses in the iron of the magnetic circuit. Eddy current losses can be reduced by subdividing the iron. Hysteresis losses depend upon the degree of saturation of the magnetic field, which is kept low in all telephone circuits. Pupin coils employ a toroidal magnetic core composed of a large number of turns of very fine iron wire with some type of enamel insulation. It is possible to employ several layers of fine wire on a continuously loaded cable, and several have been laid which use three layers. The improvement in the magnetic circuit by such subdividing is not so marked as in the coils, and the expense is very much greater. It would seem that future design will show a still greater advantage in the coil-loaded type of cable, as it is probable that R/L for loading coils can

TABLE IV.
SUMMARY OF TESTS AFTER LAYING.

	Conductor resistance Ohms	Mutual capacity Microfarad
No. 1 Circuit	8.008	0.175
No. 2 Circuit	8.008	0.174
	Electrostatic capacity Microfarad	**Dielectric resistance Megohms**
No. 1 Core	0.347	445
No. 2 Core	0.349	451
No. 3 Core	0.351	461
No. 4 Core	0.347	461

be reduced still more, economically. It might be of theoretical interest to remark that as the effective resistance of a coil-loaded conductor is a function of the frequency, it is therefore impossible to build a distortionless circuit employing iron magnetic fields.

We can, therefore, summarize the arguments that we considered in selecting the type of cable as follows:

Arguments in Favor of a Coil-Loaded Cable.—1. Could employ smaller conductors, and less gutta-percha, and secure a cheaper cable for the same transmission equivalent (disregarding terminal losses).

2. Could give the phantom circuit the same degree of loading as the physical circuits.

3. Could add any desired amount of inductance.

4. Aging of the iron cores of the loading coils could not unbalance the circuits.

Arguments in Favor of a Continuously Loaded Cable.—1. Simplicity of construction.

2. Could be laid and repaired like an ordinary gutta-percha insulated telegraph cable.

3. Short lengths added in repairs do not materially affect the transmission.

4. Not liable to faults at loading coils.

5. Faults could be loated more accurately by means of resistance measurements.

6. Is not heavily loaded, and therefore has less reflection losses at shore ends where it joins to non-loaded open wire lines, than would be the case with a coil-loaded cable.

7. Known to be reliable at the greatest depths of water.

It was after due consideration of the above factors that the continuously loaded type was decided upon, and the results obtained have amply justified the selection.

Comparing Cleveland Rates

Telephone rates in nine large cities of the east and middle west show the varying charge for excess calls where a limited or measured service is in force.

In five of these cities the American Telephone and Telegraph Company, or one of its subsidiaries, has a monopoly. This condition exists in Baltimore, Md.; Cincinnati, Ohio; Washington, D. C.; Boston, Mass.; and Detroit, Mich.

The other four cities where competition in the telephone field is in force are: Buffalo, N. Y.; Pittsburgh, Pa.; St. Louis, Mo., and Columbus, Ohio.

While rates in any city depend upon the number of subscribers, the tabulated list shows Cleveland rates to compare favorably with rates in other cities where an unlimited service is furnished.

The project of the two Cleveland telephone companies to change the present unlimited service offered by both for a metered or limited service, claimed to be necessary for the sake of better service, gave rise to the question of possible charge in the event the change in rates is granted.

Where limited service is furnished in other cities the charge for excess calls over the varying limit for different grades of measured service range from 1 cent to 5 cents. Five cents is almost universal for excess service in residence telephones.

A statement issued by the Cleveland Telephone Company shows the average cost for each call to Cleveland subscribers for the fiscal year to have been 1.33 cents. The income of the Cleveland Telephone Company was $1,690,000 for 130,000,000 calls.

The summary is as follows:

CLEVELAND—Bell. Unlimited individual business, $84 a year; individual 1,200-a-year call business, $54; two-party business, limited to 900 calls a year, $42; residence, unlimited, $48 a year; two-party unlimited residence, $36; four-party unlimited residence, $24. All are net rates from which a discount of $6 a year has been deducted, except on the first mentioned flat business rate.

CUYAHOGA, CO.—Individual business, $72 a year; two-party business, $54; four-party business, $36; individual residence, $48; two-party residence, $36; four-party residence, $24. All service unlimited; all rates net after deducting discount ranging from $4 to $2 for prompt payment.

CINCINNATI—Bell only. Individual unlimited business, $100 a year; individual business, limited to 600 calls, $48; individual unlimited residence, $48; two-party unlimited residence, $30. A charge of 3 cents for each call is made over maximum in all limited service.

DETROIT—Bell only. All business party calls are measured service at 5 cents a call; two-party lines, $42 a year; four-party lines, $30. Four-party residence service, $24 a year; two-party, $36. All limited service, but not enforced. Service now under investigation by state utilities commission. Company wants to install metered service.

BOSTON.—Bell only. Eight-mile zone service, unlimited number of calls in force. Individual business, $125 a year; individual business limited to 960 calls, $48; two-party business, limited to 840 calls, $42; four-party business, coin box, at least $36. Individual unlimited residence, $75; individual residence, limited to 900, $45; two-party unlimited, $66; two-party residence, measured, $36; four-party residence coin box, at least $24. When first placed in force there was much opposition to this plan, but it has come to be generally accepted as a fair proposition after a long trial. Three cents a call is the charge for extra calls in all measured service.

ST. LOUIS—Two companies. Individual unlimited business, $78; individual business coin box, guarantee 15 cents a day; two-party business coin box, guarantee 10 cents a day. Measured service, $45 for individual service limited to 600 calls, two-party measured service at $39 limited to 600 calls. Unlimited individual residence, $48; four-party residence, $24; two-party residence, $36. Two cents a call is the charge over maximum in limited service.

Independent offers no measured service. For residence

rates are $48 for individual line; $36 for two-party, $24 for four-party. Business rates are $78 for individual line unlimited; $66 for two-party unlimited.

Washington—Bell only. There is an unlimited individual residence line at $48 a year. There is no unlimited business service. Two-party residence service is limited to thirty calls a month at $2.50 a month with a charge of 5 cents for each additional call, also a 600 calls a year residence service at $3.25 a month. Two-party business service limited to thirty calls a month at $30. Individual business line service ranges from a limit of 600 to 4,500 calls a year, rates ranging accordingly from $39 a year to $145. Charge for excess service ranges from 1 to 5 cents a call, depending on service.

Baltimore—Bell only. All limited service. For business purposes there are eighteen arrangements ranging in calls from 600 to 5,400, rates ranging from $39 to $174 a year. Flat residence rate for individual unlimited service $48 a year. Two-party residence, limited to thirty calls a month, $24 a year; $36 a year for limit of sixty calls a month. Five cents is charged of each call in excess of maximum limit.

Pittsburgh—Two companies. Bell offers nothing but limited service, independent company giving limited service on request. Independent company offers unlimited business service, individual line, at $72, while the nearest the Bell company comes to this is a 2,400 call limited service at $111. Unlimited residence 'phone, individual line, on Bell is $57. Independent, $58. Individual business service, limited from 600 to 2,400 calls, rates ranging from $48 to 111. Two-party business, limited to thirty calls a month, $30. Residence service, aside from the above quoted individual rate, offers two-party service at $48; and a measured rate, limited to 600 calls, at $36.

Independent company's rates compare favorably. Additional calls over limitation cost 5 cents each.

Buffalo—Two companies. Bell furnished individual business line, limited to 1,200 calls, at $60, and a two-party line, limited to 800 calls, at $42. Additional calls cost 4 cents. For residences, a two-party line, limited to 800 calls, costs $36; a four-party line, limited to 800 calls, costs $24.

Independent company's rates are about the same. Metered service has been tried by independent company, meters acting as a check on calls. Four cents a call is the charge for excess.

Columbus—Two companies. The independent has automatic 'phones. The latter has stopped putting in party lines. Independent's charge for unlimited service is $25, business $40 net after deducting discount.

Bell supplies individual residence 'phone at $27 and individual business at $54. There is a two-party residence at $18, and two-party business at $36. All service unlimited.

Missouri Executives Meet

A meeting of the executive committee of the Missouri Association of Telephone Companies was held at Jefferson City, Mo., September 16. This committee, of which Houck McHenry of Jefferson City, is chairman, and Ed A. Hook, of Appleton City, secretary, is made up as follows:

William H. Bassett of St. Louis, representing the Kinloch company; Dr. S. T. Neill, Clinton; M. L. Golladay, Holden; R. A. Guthrie, Macon; C. M. Bouton, Cape Girardeau; G. V. Ross, St. Louis, representing the Bell Telephone Company, and J. A. Hudson of the Columbia Telephone Company of Columbia.

The chief business considered by the committee at the meeting was the establishment of a permanent office in Jefferson City, to be in charge of Secretary Hook. The object of this is to keep telephone companies operating in the state advised as to the rulings made from time to time by the public service commission, the construction placed by that body on various phases of the law governing telephones, etc. The committee believes that this office will be of great advantage to both the telephone people and the commission.

The office will be established at once and through it the commission will be able to keep in close touch with all telephone companies in the state. There are a great number of these companies, so far more than 700 having been listed by the public service commission, but this is not all by several hundred.

That there is great necessity for just such work as will be assigned to Secretary Hook is indicated by the large number of inquiries to the commission seeking information as to rulings, the filing of schedules, etc. Many of the owners of the smaller telephone plants appear unaware of the requirements of the law under which the public service commission is operating and it will be Secretary Hook's duty to enlighten them.

Of all the classes of utilities that come under the supervision of the commission the telephone owners seem to like the new law better than any of the others.

McReynolds Will Not Advise Chicago

Attorney General McReynolds will not accede to the request of the city of Chicago for an opinion as to whether a purchase by the American Telephone and Telegraph Company of the Illinois Tunnel Company, a competitor of the former, would be a violation of the Sherman anti-trust law.

The department of justice received from Senator Lewis a telegram requesting that no action be taken in the matter submitted to the department's consideration until certain "interested parties" could be heard.

Senator Lewis gave no names and did not say which side of the case the "interested parties" might favor. His message said a delegation would reach Washington the fore part of the next week.

Before the Lewis telegram was received, however, the attorney general had prepared a letter to inform Corporation Counsel Sexton of Chicago that under the law he was restricted in giving opinions on legal questions, such as the one involved, to the president and the heads of the various executive departments of the government.

Attorney General McReynolds has under consideration the big problem of an anti-trust suit against the American Telephone and Telegraph Company, which is being urged by the independents.

A question he is weighing is whether he should sue immediately or wait until the Interstate Commerce Commission closes its inquiry into the telephone situation to determine a policy of government ownership or regulation by a commission.

Question for the Night Operator

When a telephone girl is asleep in the company office with a night bell by her ear to rouse her in case of emergency calls, is she "working"?

Labor Commissioner Pool of Lincoln, Neb., declares she is on duty, officers of the Nebraska Telephone Company say she is not. The opinion of the telephone girl has apparently not been asked and the question has been put up to the attorney general.

In many smaller telephone offices it is customary for the girl on duty at night to go to sleep about midnight or shortly after with a "night bell" by her ear to rouse her when a patron wishes to summon a doctor or find out when the 2:11 a. m. train leaves.

The girl is in the office usually from ten to twelve hours and the state labor commissioner has ruled that this is a violation of the nine-hour-day for women.

E. M. Morsman, attorney for the Nebraska Telephone Company, contends the girl should not be regarded as on duty while she is sleeping, as at most only two or three calls are made in a night.

The Servant's Duty

By Walter K. Towers

AS A very large proportion of us must either direct the work of those who serve us or follow the directions of those whom we serve, the question of the duties which employes owes to employer is indeed vital.

The method that an employer usually adopts to enforce his authority is to dismiss from his service the employe who fails to obey his commands, or perform the duties expected of him. The fear of "losing the job" is what holds most employes to their duties. The employe usually enforces his rights by quitting when he is ordered to perform a task which he believes unreasonable. In cases where the employe has been hired for no definite period, and there is no understanding that the employment is to continue for any period, the relation of employer and employe is continued merely at the will of the parties and may be readily dissolved by either. But where there is a definite agreement—a contract—between employer and employe, fixing a term of employment, the employer may not discharge the employe without adequate grounds.

When we speak of "master" in the popular sense we usually think of one who has wide authority over the person of an employe who is in a decidedly inferior position. We are inclined to think of a "servant" as one serving in a somewhat menial capacity. But such is not the meaning of master and servant in legal terminology. The words master and servant are as broad as employer and employe, including all employers and all employes, whatever their rank, whatever the importance or responsibility of their calling. The general manager with the widest authority employed at a salary of a hundred thousand dollars a year is, in law, a servant. The simplest employer is a master.

The duty of the servant to obey the master is fundamental. It is of the essence of the contract of employment and must always be recognized. "A promise by the servant to obey the lawful and reasonable orders of his master within the scope of his contract is implied by law," said a New York judge. "Submission to the master's will is the law of the contract." An authority on this subject has written, "Where a servant deliberately violates his master's orders, or refuses to obey them when given, he is clearly guilty of the grossest breach of contract. His duty is to obey the master in all things for which he became bound expressly, or in which obedience is implied from the nature of the service undertaken."

The employer's usual redress for a refusal to obey on the part of his servant is a dismissal from his service. This right of a master to dismiss a servant who has violated this duty of obedience is firmly settled. As to just what amounts to such a defiance of proper authority as to justify an employer in dismissing an employe whom it has been agreed is to serve for a definite period is the question that is of most immediate interest and importance to employer and employe.

Spaine was a farm laborer in the employ of Arnott for the usual term of one year. He usually breakfasted at 5 o'clock and dined at 2. One day Arnott ordered him to go with some horses to the marsh which was a mile off, before dinner, dinner then being ready. The plaintiff said that he had done his due, and would not go until he had had his dinner. Arnott told him to go about his business, and he went without making any submission to the instructions. Spaine later sued Arnott because of wrongful dismissal, seeking damages for the breach of contract of employment, but he failed to recover.

"If Spaine refused to obey his master's orders," said the judge, "I think he was warranted in turning him away. It would be exceedingly inconvenient if the servant were to be permitted to set himself up to control his master in his domestic relations, such as the time of dinner. After a refusal on the part of the servant to perform his work the master is not bound to keep him on as a burthensome and useless servant to the end of the year."

This case is rather extreme, and many courts would probably now rule such an order as unreasonable, and refusal to obey it not sufficient grounds for dismissal. It illustrates the undoubted principle that a master may dismiss his servant for a single act of disobedience. A farm laborer who refused to work during harvest time till 8 o'clock was held properly dismissed, as was also a coachman who, against his employer's express orders, carried friends of his own in his employer's carriage. A traveling salesman who refused to comply with the request of his employer to return his samples, the superintendent who refused to obey the superior's orders to reinstate an employe, and the teacher who refused to reinstate a pupil who was instructed to do so by the school board, were all held to be properly dismissed for such single acts of disobedience. Numberless examples might be discovered of instances of disobedience that have been held to justify a dismissal.

Not only may a master dismiss a disobedient servant, but he may also sue that servant and secure damages for any injury which may have been caused by reason of the servant' disobedience.

While the general rule is that the disobedience of a order is a breach of the duty which the employe ow... the employer, and so a justification for dismissal, ; f... are certain circumstances which will justify a serv... his disobedience. A servant need not obey an ... which is unreasonable, but an employe should be v... certain that the instruction would be deemed obviously and certainly unreasonable by a normal person before he disobeys for that reason. Nor need a servant obey instructions which are unlawful. Neither may an employe be dismissed for failure to obey orders instructing him to perform services which are not properly within the duties for which he was employed.

A servant may not be dismissed for the failure to obey an order in regard to a matter of small importance and so trivial that the contract of employment is not affected. If the disobedience was unintentional, and in regard to matters of no importance, and the instructions were in regard to matters of mere detail and not of a character to require in all circumstances strict obedience, the law will generally insist that there is not sufficient grounds for the severing of the relation of master and servant.

A master may dismiss a servant though the act in question was not actually injurious to him—it is enough that there was a failure to obey in a matter of importance,

or a wilful disobedience of any character of a proper order.

As before stated, a servant may not be dismissed for failure to obey an instruction requiring services of a kind different from those which he was hired to perform. An employe is bound to perform the duties he was engaged to do and no others. Thus a boy hired to care for sheep and assist at hay time, cannot be required to perform the additional duty of taking charge of several cattle in the winter. A ballet dancer who has been engaged as *premiere danseuse* cannot be compelled to take an inferior position in the ballet, nor is a lady's maid expected to milk cows. But the master's requirements must be clearly beyond the scope of the servant's employment to justify a refusal. Thus a man hired for general work on a farm is not justified in abandoning his employment because he is set to cutting flax with a machine and thinks this too hard work, nor because he is required to carry bricks.

The hours at which a servant is required to work are not infrequently fixed by the terms of the agreement between employer and employe. The length of a working day may also be prescribed by law. It may be understood from the nature of the employment, but a servant cannot be required to work at unreasonable times, nor for periods, which considering all the circumstances, are excessive.

As to holidays the laws of the state control. Other days off may be recognized and understood by custom or stated in the contract. Sunday is usually a legal holiday, or understood as a holiday, yet it may not be in exceptional callings as those of seaman or railroad employe.

Sickness or other urgent necessity is a recognized excuse for an employe's failure to work during periods of required labor. But a servant who absents himself from work, contrary to the instructions of his employer, for no good cause, is guilty of a breach of duty and may be dismissed.

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Last Spring's Storm Losses

Sleet storms of last February and March, which played such havoc with telephone and electric wires and cables throughout northern Illinois, are vividly recalled in the final summing up of its losses by the Chicago Telephone Company.

After six months of steady work, the repairs have just about been completed, and the telephone company, with accurate figures before it, finds that the sum total of its losses will be at least half a million dollars, and perhaps more than that.

More than 3,000 miles of wire and 7,000 poles were required in the repair work within a radius of 100 miles of Chicago. The two storms, coming as they did, one right after the other, struck the company the hardest blow it ever has experienced. The section that suffered most embraces the central and northwestern part of Cook county, DuPage and Kane counties, most of Kendall and the northwestern part of McHenry county. In this territory alone the company's loss was $130,000.

Twenty-seven thousand telephones were put out of commission by these storms, but following its usual policy of serving the public quickly and efficiently, at all costs, the company put 1,000 men into the field, and by the construction of temporary lines, service was re-established in most places within 24 hours.

The enormous cost of these temporary repairs was a total loss to the company, as the work has to be done all over again when the new permanent lines are built, and the great quantity of wire used for the temporary lines was good only for what it would bring as so much junk.

In the Aurora district, which was the hardest hit, 5,000 telephones were put out of commission. In the Oak Park district 3,000 were out, while Elgin, Wheaton and LaGrange each had 2,000 telephones out of use. Record time was made in restoring service between Chicago and Wheaton, a distance of 26 miles. Temporary lines were constructed, and in use within a few hours.

The telephone company's method of fighting storms such as those which occurred early in the year, makes a story of unusual interest. The company is admirably equipped to cope with any and all emergencies. Central supply stations are to be found everywhere, and the minute trouble is reported, the supplies needed to make repairs are rushed to the point desired with express speed. All trouble reports first come to what is known as the "test desk" in Chicago from test men whose duty is to locate trouble on the lines. During a storm the test force is increased in size to a small army, and as fast as trouble reports come in, repair men are sent out to the various points where their services are needed.

When it was seen the regular repair forces would be inadequate during the last big storms, the company called out its reserve forces and obtained men from other companies.

Experienced linemen were brought into the storm zone from all parts of the country. It was particularly hard to get experienced men at that time. Owing to the floods in Ohio, Indiana and elsewhere, the general demand for experienced linemen was so great that their services were at a premium. The company succeeded in getting about 1,000 men into the field, and in most places service was re-established within 24 hours.

Oregon Rejects Promotion Scheme

The Oregon Enunciator Company and the Oregon Telephone Herald, both Portland, Ore., companies, were refused permission by Commissioner Watson to sell stock in the state. They are rival companies, the object of each being to furnish news by telephone at stated hours, to connect with churches, theaters, home and similar places. A set of receivers is to be provided each family of patrons, which would receive the news of the morning as it ate breakfast, the news being sent from a central station. All important news would be selected, and the family could hear sermons and music.

Watson holds that neither company has wires or any means of securing the service promised, and that until they acquire these they cannot sell stock in Oregon.

Moline, Ill., to Vote on Franchise

Judge Bollinger and Manager Stanton of the Automatic Home Telephone Company, Moline, Ill., positively refused to pay a bonus for franchise right, and one of the feasible ways to settle the controversy now is to leave the matter to a vote of the people. The aldermen do not feel at liberty to depart from the rule of asking compensation from public service companies for street privileges. They do not look on the sum as demanded for the franchise right as a bonus or gift to the city, but rather a reasonable sum for the privileges to be given.

However, the aldermen say that they do not want to stand in the way of permitting a competing telephone company to come in and the matter will go to a vote.

Developing the Condenser Telephone

By Karl Ort and Josef Rieger*

THE speaking condenser, since its discovery by William Thompson in 1863, has been investigated and developed by a number of individuals. Pollard and Garnier used a polarized condenser as a telephone receiver in 1874, two years before the discovery of the electromagnetic receiver by Bell and Gray. Dolbear in 1879, however, was the first to obtain good results. Further progress was made by Dr. Cornelius Herz and Dunand in France. With a condenser of 5 mfd. to 10 mfd. capacity, Herz is said to have succeeded in communicating between Paris and Orleans and between Paris and Tours. Since 1881 J. W. Giltay has contributed considerably to the theory of the speaking condenser. His investigations deal principally with the polarization of the condensers, and he has shown that unpolarized receivers reproduce all sounds an octave above the original. Workers in more recent times include Argyroponlus, H. Abraham and Peukert. The present authors have been concerned with the problem since 1907, and reported their first experiment in the *E.T.Z.*, 1909, page 655. The use of the apparatus has been chiefly simplified by abandoning a battery for charging in favor of a suitable generator, and an account of some improvements and interesting experiments is given below.

Practical Improvements.—The first condensers made by the authors were of rectangular shape with stretched paper dielectric. The edges were clamped to avoid noises due to the condenser itself. Circular leaves were afterwards used, consisting of thin tissue paper saturated with shellac and coated with tinfoil. The condensers were made up from these leaves to about 0.05-0.06 mfd., and used, among other things, to prove that the condenser

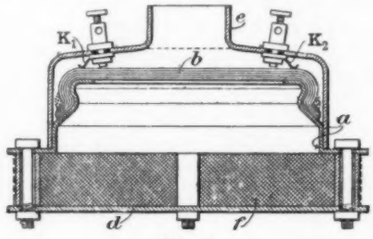


Fig. 1.

as a whole vibrates as a single diaphragm, and that the amount of sound produced depends upon the area of the plates.

These paper condensers were never as sensitive as the electromagnetic telephone, and the low insulation resistance (about 500,000 ohms) was found to be chiefly responsible.

After much experimenting, indiarubber was selected as the best material for the leaves on account of its high insulating properties and low dielectric losses. Mica, although suitable in other ways, was abandoned on account of these losses. The construction of a rubber condenser telephone is shown in Fig. 1. On an aluminum drum, *a*, 10 cm. in diameter, the rubber leaves are stretched in the manner of a drumskin. They are fixed around the periphery so that no irregular vibration can take place. Each leaf is from 0.3 mm. to 0.5 mm. in thickness and weighs about 400 mg. The drum is covered by a cap, *e*, provided with contacts, k_1 and k_2, making connection with the plates, and a back plate, *d*, is fixed at a distance from the case as a reflector for sound which emanates from the inner surface of the condenser. The choice of a material for the plates was settled only after many comparative tests, aluminum leaf about 0.001 mm. in thickness being adopted as giving the greatest sensitivity. This was stuck to the rubber leaves by a

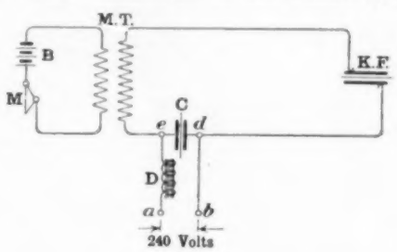


Fig. 2.

special process. The insulation resistance of complete condensers of 0.088 mfd. made in this way was 400 megohms with 110 volts, and 250 megohms with 240 volts.

On account of its simplicity, the apparatus as described was considered well adapted for use as a loud speaker, and it has, therefore, been improved on these lines. A polarizing voltage as high as possible must be used to secure good volume. The breakdown voltage of the condenser was between 500 and 600 volts, and for most experiments the authors used a direct-current voltage of 240 volts from lighting of the power mains. The circuit shown in Fig. 2 was devised in order to suppress noises from the high voltage supply. *C* is a fixed capacity of about 2 mfd. and *D* is a choking coil, such as the secondary winding of a telephone induction coil. This circuit, modified as in Fig. 3, has also been used with alternating-current supply, which in this case is transformed at *WT* to a suitable value, and rectified by means of four small aluminum-lead cells connected as shown at *Gl.* A larger number of cells would be required for voltages above 80 to 100, but as only a very small current is taken they may be quite small in size. No disturbance was experienced with this method.

For talking in both directions it is preferable to connect the condensers in parallel and to charge to a higher potential. In the case of long lines charging can be done at both ends if equal voltage conditions are available.

The charging or polarizing voltage is of great importance in relation to the volume of sound given by the receiver. With 240 volts the authors found that the volume was equal to that of an electromagnetic loud-speaking receiver and increased substantially with voltages of 300 and 400 volts. On fitting resonators, perfectly intelligible reproduction was obtained; speech, singing, etc., being audible at night at a distance of 60 metres. A Siemens & Halske electromagnetic loud speaker with horn was easily heard at this distance, but not easily understood. The transmitter used was the Stentor Mikrophon, by Mix and Genset, fed by five or six accumulator cells.

*Abstract of an article in the *Archiv für Elektrotechnik.*

The question of polarizing is the principal drawback in the use of the condenser telephone, a drawback which has been overcome in a very simple manner in the case of the electromagnetic telephone by the permanent magnet. High voltage is easily obtained, but the inclusion of high voltages in the speech circuit makes it necessary to carry out all such installations according to heavy-current requirements. The authors have recently succeeded in surmounting this difficulty by means of a special circuit, details of which are, however, not yet available.

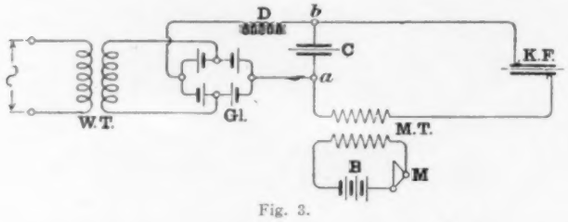


Fig. 3.

Theoretical Treatment.—The force with which two condenser plates are attracted when charged to a potential E, is

$$P_1 = \text{const.} \times E^2.$$

If these plates be connected to the secondary of an induction coil, giving at any instant a potential ΔE, then the force is

$$\Delta P = \text{const.} \times \Delta E^2.$$

If now the plates be charged by a constant direct-current voltage to a potential E, and the potential ΔE induced in the secondary of the coil be superposed on this, the force becomes

$$P_2 = \text{const.} \times (E + \Delta E)^2 = \text{const.} \times (E^2 + 2E\Delta E + \Delta E^2).$$

The effect of the induced potential alone is therefore

$$P = P_2 - P_1 = \text{const.} \times (2E\Delta E + \Delta E^2),$$

or, neglecting ΔE^2,

$$P = 2E\Delta E,$$

which is much greater than the force ΔP with the unpolarized plates. Hence the increased sensitivity with increased polarizing potential. As with the electromagnetic telephone, however, the amount of polarization is limited. In the one case the limit is reached on the buckling of the diaphragm, and in the other case on the breakdown of the dielectric. Polarization, however, not only increases the sensibility of a receiver, but has an important bearing on the faithful reproduction. An unpolarized receiver will always reproduce sounds an octave above their true pitch, since there are two attractions or repulsions during a period. Giltay used condensers to investigate this problem on account of the difficulty of completely demagnetizing the magnet of the ordinary receiver. He proved the theorem experimentally by applying a polarizing battery intermittently while sounding a flute into the transmitter, and found also that the vowel "o" was heard as "a" (ah) on the unpolarized receiver, due to the difference of an octave between the characteristic frequencies of the two vowels. Subsequently he found that intelligible speech could be obtained from an unpolarized condenser in which the dielectric was paraffin paper, and explained the phenomenon by assuming residual charge to be given to the dielectric by the speech current, thus polarizing the condenser. That this effect takes place only with speech and not with perfect tones was proved also by experimenting with the flute. A remarkable effect was observed with a mica condenser. When unpolarized the reproduction was unintelligible, as with other condensers, and on applying the charging battery the speech was loud and clear, but only for a few moments. After 30 seconds it was weak and quite unintelligible, and the same process was observed on disconnecting the battery.

These experiments have been repeated by the authors, using (1) a paper condenser of 0.06 mfd. and 500,000 ohms insulation resistance, (2) a rubber condenser of 0.088 mfd. and 400 ohms insulation resistance, and (3) a mica condenser of 0.228 mfd. and 190 ohms insulation resistance. The paper condenser clearly showed the alteration in pitch caused by depolarizing, but owing to the use of a condenser, C, in the circuit (Fig. 2) the change from the polarized condition was not complete until this condenser had been discharged through the dielectric of the condenser telephone, which was of low insulation. By short-circuiting the condenser C simultaneously with the disconnection of the battery the effect was immediate. The high insulation resistance of the rubber condenser made it very difficult to show the alteration of pitch, and, although appreciably weaker, speech could be easily understood without the help of a polarizing battery. On disconnecting the polarizing voltage it has been found that the original volume is maintained for some time and then decreases slowly. Hence the expenditure of current to maintain these condensers charged is exceedingly small. The same effects were observed with mica as Giltay had noticed, and the conclusion drawn is that the diminution in volume is due to the heavy dielectric hysteresis losses, which prohibit the use of the material for condenser telephones.

The capacity of the condenser telephone is of great importance. An attempt was made to increase the movement of each leaf by joining up the plates in pairs, which is equivalent to connecting a series of two-plate condensers in parallel, but as twice the number of leaves were necessary to give capacity equal to the ordinary arrangement, no improvement resulted, an increase in the number of leaves raising the mass, and therefore reducing the sensitivity.

The variation of capacity with frequency has also been investigated. The apparent resistance of the condenser is $R = a + j\omega C$, in which a is composed of leakage, dielectric losses and a part representing the energy converted into sound. It has been shown that a is extremely small, so that R is approximately equal to $j\omega C$. The capacity was measured between $\omega = 1{,}800$ and $6{,}000$ by the Anderson method, and no variation at all could be detected whether the charging potential of 240 volts was

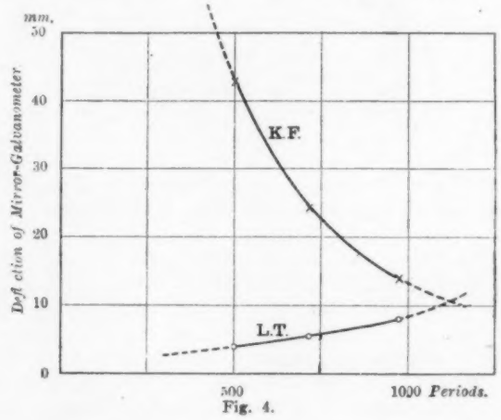


Fig. 4.

applied or not. It is interesting to contrast this with the electromagnetic telephone, whose inductance and effective resistance vary considerably in consequence of the natural vibration of the diaphragm. The condenser telephone has no mechanical natural period. Each of the rubber diaphragms has a period of its own, but the periods of the separate diaphragms are all different, so that no definite natural vibration of the whole system is possible. Moreover, the disposition of the several layers gives such good damping that they vibrate aperiodically. There is no "rattling," as in the electromagnetic receiver.

The condenser telephone is not, however, entirely free from resonance effects. It forms an oscillating circuit with the secondary winding of the coil, which is in close coupling with the primary circuit, and if the line is short and of negligible inductance frequencies equal to $1/2\pi\sqrt{LC}$ will resonate, and possibly render the speech unintelligible. Several speech tests were made with one condenser telephone connected in turn with four different induction coils, giving oscillating frequencies respectively of 520~, 546~, 850~ and 1,420~, calculated from the inductance of the secondary of the coil with primary open. Lower natural frequencies were also experimented with by the addition of extra inductance into the circuit or by paralleling two condensers. The conclusion arrived at is that clearness of speech does not suffer appreciably if the resonating frequency does not exceed $\omega = 3{,}000$, which agrees with the works of Cohen and Shepherd, Devaux-Charbonell and K. W. Wagner, who find the principal frequencies in telephonic transmission to lie between $\omega = 3{,}000$ and $\omega = 6{,}000$. Quantitative tests, made with a barretter, showed that in each case there were two maxima to the current curve, due to the resonance of both primary and secondary circuits. The induction coils giving the clearest speech resonated at about 500~, and 600~, frequencies which are of relatively small amplitude in the voice, and the more important frequencies remained unaffected and therefore in their correct proportion. It is quite possible by the use of a suitable coil to keep the resonating frequency low without impairing the sensitivity of the condenser telephone, whereas this cannot be done with the electromagnetic instrument.

The relative sensitivities of a condenser telephone and a Siemens & Halske loud-speaker have been ascertained by measuring on a barretter the current which is just sufficient to give an audible sound. The curves of current are shown in Fig. 4, but these cannot be taken as representing the true relative sensitivities on account of the great difference between the phase relations in each case. What is really required is a measurement of the consumption of energy in the receiver, from which the losses could be deducted. Although it is possible to measure the phase relations, there is no method of computing the energy converted into sound, except by estimation.

The losses occurring in a condenser telephone are principally due to dielectric hysteresis, and are exceedingly small with a rubber dielectric. The useful work done as sound is also extremely small, the phase angle having been found by measurement to be very nearly 90 degrees. In the electromagnetic telephone, on the other hand, losses from heating, hysteresis and eddy currents combine to give an angle of much less than 90 degrees, although the angle corresponding to the useful work is almost negligible. H. Abraham has estimated the efficiency of a receiver at 0.1 per cent. For loud-speaking purposes, however, the condenser has the great advantage that the line current can be increased by using heavy-current transmitters, without any "rattling" of the diaphragms.

Government Ownership Again

A movement is gathering force in Democratic circles, at Washington, D. C., to bring the telegraph and telephone lines of the country under the postoffice department in some form of government ownership.

Unless nipped by a protest from the White House the movement probably will find its first expression through the annual report of Postmaster General Burleson, which will be presented to the president January 1, 1914.

What is known of the plan as it stands does not contemplate action along lines advocated in bills looking to government ownership of telephones and telegraphs, which already have been introduced.

The first step to be taken will be to call upon the postmaster general to submit estimates of the probable cost (1) of installing government telegraph lines and telephone lines in competition with the existing companies and (2) of purchasing all existing lines. Either would involve a physical valuation of the two companies, probably through the interstate commerce commission.

Representative Lewis of Maryland is now at work on a measure calling for government ownership of telegraph lines.

Telephone Manners Reveal Personality

That telephone manners are a true test of character, and that the man who is continually impatient and insulting when using the telephone is likely to be the same way in dealing with his wife, is declared by a bright and thoughtful operator in the local Cumberland exchange of Lederon, Miss.

She says that years of observation have taught her that the man who bears the reputation of being petulant and unreasonable at home and in business is usually the one who delights in quarreling with the operator, while the man who talks in a quiet, low voice, always maintaining his politeness, almost invariably is somebody who is looked up to and amounts to something in the community.

She says that the natural voice asserts itself over the telephone and that the operator can get the speaker's true number in more ways than one. The people who shriek and rave and continually complain, she says, and lose their self-control, simply hamper the efforts the operator is making to give them good service.

Telephone Ousts Telegraph on K-Line

All trains on the Hannibal division of the "K" line, between Hannibal and Burlington, Iowa, are now dispatched by means of telephone instead of by telegraph. The work of installation was completed this week and is now being regularly used.

The telephone has taken the place of the telegraph for the past two years on the "K" line between Hannibal and St. Louis. Trains are dispatched both ways from Hannibal and in the dispatcher's office an extensive switchboard with a special operator has been installed.

The Burlington is gradually working toward the installation of telephones in place of the telegraph all over its entire system.

Commission Control of Public Utilities

By John H. Roemer*

As plants can neither be constructed nor operated except by virtue of a grant from the municipality or state, it is vital both to the owners of such plants and the public that the rights of each and the corresponding duties of the other in respect to the public functions of the public utility be clearly defined and maintained in a spirit of fairness and justice to both parties. These obligations have generally been prescribed in the franchises granted by the municipalities as state agencies, or by the state itself, conferring upon the grantees the right to construct, maintain and operate such plants. But as the term of a franchise must of necessity be for a long period in order to induce capital to invest in the enterprise, experience has demonstrated that it has been impossible to fix terms and conditions of the franchise satisfactorily to meet unforeseen and unforeseeable exigencies which arise in the progress of time from many causes.

No one can prophesy the changes in the arts embraced in public utility services, the developments and necessities of the communities served or the requirements of the utilities to perform their functions under changed conditions. In the last few years enormous increases in cost of material and labor which enter into and become part of the cost of the service which the public utility is obliged to furnish are an element that has not always been counterbalanced by the economies resulting from new inventions and increased business, and unless the charges for the service could be increased in such event it would result, in case of the weaker utility, either in an impairment of the quality of the service or in financial embarrassment of the corporation or individual rendering the service.

As an illustration of another burden that is often cast upon a utility and which may not be anticipated when the franchise is granted, we may refer to the advancement in the art of telephony, which within a very few years has been little less than marvelous. Costly telephone equipments have been scrapped and entire systems reconstructed to meet the public requirement for the best service. The art of generating electric current has also advanced with such rapid strides that the expensive electric equipment of a few years ago is today found in the scrap pile, having no other value than that of junk. In other utilities the changes have not been so marked and equipment has become more or less standardized, but who can tell what a quarter of a century may bring forth in any of the arts or sciences?

Under the circumstances it is not at all strange that all attempts rigidly to prescribe in detail the obligations of the public utility to the public and vice versa during the life of a franchise have generally met with signal failure. To meet existing conditions, attempts have frequently been made to change the terms of the franchise. This has often resulted in engendering animosity between the public authorities and the management of public service corporations. The negotiations have not always been free from the suspicion that improper methods have been employed to induce those representing the public in the transactions to consent to terms and conditions detrimental to public interest. As a result such public service corporations become a factor in local politics, and questions involving the most important interests of both the public and the corporations have become issues in local political campaigns. Such issues often involve economic laws and sound business principles which cannot be determined by the votes of an uninformed electorate. These unnecessary conflicts between the public and those rendering public services are the cause of more corruption in municipal government than anything else.

Students of economic science have for many years been endeavoring to devise a limited franchise which would be adequate during the term thereof to meet the requirements of the public as well as those of the public service corporations, but they have found it impossible to frame a model franchise of any character based upon sound economic principles which could either be limited in time or could prescribe definitely the charges to be exacted or the quality of the service to be rendered during the life of the franchise. If a franchise is to be limited in time, provision must be made for its amortization. This compels the public not only to pay a fair return upon the investment during the life of the franchise but also to provide a sinking fund which, with the scrap value of the plant at the termination of the franchise, is equivalent to the original investment. Others have advised the adoption of franchises for long periods of years, reserving to the municipal councils the right to fix rates and establish standards of service at definite intervals or from time to time at the will of the councils. The general experience under franchises of this character has not been such as to warrant their commendation. The expenditure of large sums of money by some of the larger cities to ascertain all the essential facts necessary for intelligent and lawful action on the part of common councils invested with power to establish rates has been more frequently wasted than profitable, as the facts thus acquired have generally been ignored and action taken which was either prompted by prejudice or based upon political consideration.

From an economic standpoint, an unlimited franchise with the provision that the municipality may revoke it at any time upon condition that it acquire the plant by paying to the company the reasonable value thereof is generally regarded by those who have given the subject exhaustive study and consideration as the best kind of franchise. The necessity of the service in all probability will not terminate with or prior to the time of the expiration of the limited franchise. It must be obvious to all who have given the subject any serious consideration that an indeterminate franchise containing the provision that the rates and services shall at all times be subject to revision by an impartial and independent tribunal will result in the greatest good to the public as well as to the investors in such enterprises. It will eliminate all friction between the community served and the agency serving it. Naturally such a policy would be opposed by the average municipal politician who rides into office either as a champion or an opponent of the public utility which usually constitutes a factor in municipal politics.

It was with a view of placing public utilities upon a sound economic basis and eliminating all unnecessary

*Address delivered by the chairman of the Railroad Commission of Wisconsin, at the Association Island meeting, September 4, 1913.

friction between the public and such concerns due to causes arising from ignorance of the economic status of public utilities and their moral and legal relations to the public that the Wisconsin public utilities law was framed and enacted. That public utilities are virtually monopolies by nature and must be dealt with as such in any just and comprehensive system of state regulation is the fundamental economic principle upon which the law was constructed. Without protection of such monopolies only a limited and inadequate supervision of their affairs by public authorities can be morally justified. At the very foundation of the Wisconsin system lies a uniform indeterminate franchise, denominated "an indeterminate permit," which gives the corporation a legally protected monopoly. It can never be deprived of its property unless the municipality determines to acquire the same, and then just compensation must be paid therefor, which is fixed and determined by the commission.

Every element of value, both tangible and intangible, is to be considered in reaching a result, excepting only franchise values, which are necessarily excluded by the general policy of the law. The object to be attained is the fair value of the property as a going concern. This, in the contemplation of the statutes, is the proper capitalization upon which returns must be allowed.

The element usually available for consideration are the original cost of construction, the amount expended in permanent improvements and extensions, the reproduction cost and the same less depreciation, and the going value. In arriving at a fair and equitable appraisement of the physical structure the commission has considered, as more or less controlling, the reproductive cost based on the average prices of material and labor for the five years immediately preceding the time of appraisement. The results thus attained have been so obviously just and equitable that the municipalities and the utilities generally have acquiesced therein. Nevertheless, for the sake of comparison and illumination of the subject, the reproductive cost based on current prices also is considered. The commission has never confined itself to any one basis to the exclusion of others in reaching a conclusion. Every factor bearing upon the subject is carefully weighed and such importance given to it as the situation in the light of all the circumstances demands. While a form of universal application might be desirable, yet, from the very nature of the undertaking, such is impossible. In the last analysis enlightened judgment and conscience must be applied to the facts in hand if a just determination is to result.

The uniform classifications of accounts have now been in effect for over three years. In addition to the utilities operating under them in Wisconsin numerous companies in other states as well as in other countries have voluntarily adopted the prescribed accounts with little modification. One of the features of these accounts, in which the classification differs from similar prescribed classifications in other parts of the country, and concerning which it was submitted at first to much criticism, is that it endeavors to serve as a basis for ascertaining the cost of service. Although it is self-evident that no business of the character involved in public utility service can be successfully conducted without an accurate knowledge of the cost of rendering the service in which the utility is engaged, it was surprising to learn that while the best conducted privately owned utilities had in a measure recognized the importance of such information and had somewhat imperfectly attempted to ascertain the same, the majority of the managers of municipal plants had generally been wholly oblivious to the necessity of any such knowledge.

This lack of efficiency on the part of the managements of municipal plants has been due partly to various causes, many of them beyond the control of the municipal utility plant. The first of these is the question of organization and responsibility. A part of the public function or department of city government is frequently administered by a superintendent, board of public works, engineer, board of commisssioners or committee of the common council, and it is frequently difficult to ascertain just where the duties of these individual city officials begin and end. The matter of rotation in office seriously interferes with continued efficient management.

Accounts pertaining to municipal plants were often merged with other accounts of municipalities, and even where separation was made the accounting was so crude and inaccurate that it was impossible to ascertain therefrom even approximately the cost of any class of service.

The local authorities in control of municipal utilities were at first slow to respond to the demands of the commission, except in the most progressive communities. In some instances it appeared that those in charge of such plants were apprehensive that proper methods of accounting might result in disclosures reflecting upon the capacity or integrity of the management. In other instances there seemed to be no one in the organization of employes capable of keeping a set of books intelligently. This was particularly true where the management changed with the municipal administration. However, in practically every community where the management was intrusted to a non-partisan board whose personnel was more or less permanent there was no difficulty in securing hearty cooperation in putting into effect the prescribed system of accounting. At the present time, practically every utility within the state, whether municipally or privately owned, is now keeping its accounts according to the system prescribed by the commission.

As the various plants are classified according to size, comparison in results of operation between plants in the same class has proved of inestimable value to the managements of all plants, either publicly or privately owned. By studying the accounts of the various plants the commission is enabled to become familiar with the details of operation of each plant and to point out to the management economies that may be adopted and improvements that may be made in the conduct of the business.

To detect violations of the rules relating to service, the inspectors of the commission are constantly traveling through the state making secret inspections. These rules differ materially from those in vogue in other states and countries. They place the responsibility for the character or the quality of the service primarily upon the utility, which is required to test its own meters and make various other specific tests of the quality of the service prescribed in the rules and regulations, and also to keep a record of the results of all such tests, which must be kept open for public inspection. While the accuracy of meters is an essential element in the economic use of both gas and electricity, the maintenance of adequate pressures is more essential to the efficient use of either. Consequently, general systematic surveys of gas pressures and electric voltages by means of recording instruments are made. The electric inspectors take continuous records of voltage over the distribution systems, calibrate the companies' standard instruments and supervise the testing of consumers' meters and the renewal of incandescent lamps.

When the general survey of the service in the state was

first made it was found that few of the plants were able to comply with the prescribed standards without making alterations and improvements. Hundreds of thousands of dollars were spent by the different utilities in order to bring their equipment to the point where compliance with the rules of service was possible. Many of the managers of the municipal plants were reluctant to make the necessary changes in order to improve the quality of their service; nevertheless, through persistent importuning and threats of prosecution on the part of the commission, the necessary changes are being made gradually and additional equipment installed where necessary.

At the time that systematic inspection was undertaken only about fifteen of the 250 electric plants in the state, serving some 15,000 consumers, were giving reasonably satisfactory voltage. In order to comply with the requirements of the rules of service, about forty plants had to be generally overhauled and practically reconstructed. In the remaining plants it was necessary to install governors, automatic voltage regulators and additional transformers, and also to make extensions and changes in the structure of the plants and distribution systems. Some of this work has not yet been completed and it may be stated that about 50,000 consumers of electric current out of a total of 75,000 are now receiving satisfactory electric service as measured by the prescribed standard. In this connection it must be borne in mind that the state regulation of voltage is new and that work similar to this in scope has never before been attempted. There is as a result of the improvement of service, according to the computation of the engineers of the commission, a money saving of at least $75,000 annually to electric consumers.

At the time that administration of the law was first undertaken it was found that there were few public utilities in the state which did not have in effect a large number of discriminatory rates. While all had established schedules of rates, the departures from such schedules were numerous. Free and reduced rates were given to favored persons. Many thousands of such discriminations were in existence. While the practice of discriminating between patrons in the matter of rates and service had become general, as is usually the case where there is no independent tribunal provided by law charged with the special duty of enforcing the obligations of public utilities to the public, it was difficult for the utilities, in many instances, to wipe out the discriminations of their own accord. These had often been forced upon the utility by those having more or less influence in the community and who were in a position to harass the utility through the common council and otherwise unless they were favored as patrons. Such influences were not entirely unlike those which, a few years ago, often compelled railway companies to indulge in similar practices. By a general order, the commission compelled every utility in the state to eliminate discrimination of all kinds and charge in every case the regular schedule rates.

As rates made by the commission are based upon the cost of service, the commission has in each instance where a schedule of rates has been challenged worked out a scientific schedule which classified the services according to the cost thereof. The result of this has been most gratifying. Business has extended and the returns to the public utility increased. As an illustration, one of the largest public service corporations in the state, operating both a gas and an electric plant, valued at approximately $1,000,000, was obliged in a rate case to put into effect a scientific schedule of rates which provided a reduction of the maximum rates theretofore in effect but so classified the service that the consumers in each class were paying for the services rendered rates based upon the cost of the service to the utility. The company estimated that the new schedule of rates would operate to reduce its net revenue approximately $30,000 per annum. Much to the surprise of the management, the business at once began to develop, and as a result of the expansion thereof within less than two years the management voluntarily applied to the commission for authority to make a further reduction of rates. This is but one of the many instances of the character that might be called to your attention.

In order to facilitate work along lines of establishing scientific schedules of rates, the commission has published the rates, rules and regulations of all the utilities in the state, and by comparison and by the use of hypothetical plans has demonstrated what are reasonable rates, rules and regulations. In a number of cases small utilities have asked the commission to revise their entire schedule of rates. In fact, utilities often come to the commission asking that a schedule of rates be provided which will develop their business. Generally the managements of the utilities carefully study the decisions of the commission, and they are often thereby able to adjust their schedules of rates upon the principles which govern the commission in its actions.

Perhaps the larger number of utilities in the state are today operating upon schedules which are more or less scientific and based in a measure upon the cost of the various services rendered. It is gratifying to know that such utilities as have established such schedules of rates have been able to extend their business greatly, increase their operating revenues and their net incomes, and reduce the cost of the service to the consumers.

Inquiry is often made by those interested in utilities outside of the state of Wisconsin as to the rate of return that is allowed to a utility in Wisconsin. In reply to this it may be said that the commission has never established and does not intend to establish any fixed rate of return.

Intelligent regulation of public utilities requires engineering, accounting and statistical skill of a high order. Those intrusted with the work of investigation and study of the various subjects presented for consideration must have scientific knowledge in the respective branches or departments of utility management and operation. With a competent staff of experts in the different lines of service, engaged constantly in examining plants throughout the state, it is possible for the regulating board to bring to the solution of every problem arising a breadth of vision and experience that is invaluable both to the public and to the utility.

No regulation can be effective which is not based upon accurate information and which is not actuated by a sense of justice and equity. In the light of the past, it must be conceded that an independent tribunal, free from local influences and prejudices and assisted by a corps of trained experts, is better qualified to regulate efficiently public service corporations and individuals engaged in public services than any municipal council or local tribunal. In few instances would it be possible for municipalities to maintain the necessary organization of competent assistants to deal intelligently with the problems involved in the regulation of public utilities. The cost of such an organization would be prohibitive to most municipalities. In central control there is therefore not only efficiency but also economy. One body can serve all municipalities as well as one municipality and serve them better.

European Telephone Development

By Fred W. Scholz

S-S-TELEPHONE SYSTEM FOR MEDIUM AND LARGE SIZE TELEPHONE EXCHANGES.

THE simultaneous switch (S-S) system belongs to the class of telephone distributing systems with common battery operation. Its chief characteristics are the following: 1. No calling relay. 2. No cut-off relay. 3. Automatic distribution of incoming calls. 4. No intermediate distributer. 5. Saving of about 40 per cent of the initial costs above that of the ordinary c. b. system. 6. Saving of 40 per cent of operators. 7. Increased safety and speed of operation. 8. Less space required. 9. Simple form. 10. No difference as regards technical installation.

The subscribers at any exchange are combined in groups of 50,100 or more, each of which groups is connected to a common call or distributing instrument—the "simultaneous" switchboard. The type of connection and the relation between this instrument and the rest of the exchange equipment is shown in Fig. 1; *a b* is a subscriber's line which is connected to the answering keys *d, d, d*. The *a*-side of the line leads finally to the metal piece *e* of the rotating switch *f*. The rotating arm *g* of the latter connects, in the given position, the metal piece *e* and with it, the *a*-side of the line by way of the electromagnet *h* with battery and ground. With the arm *g*, but insulated from it, the arm *k* turns, whose extreme end in turn touches the contacts *l, l, l*, and thus conducts the

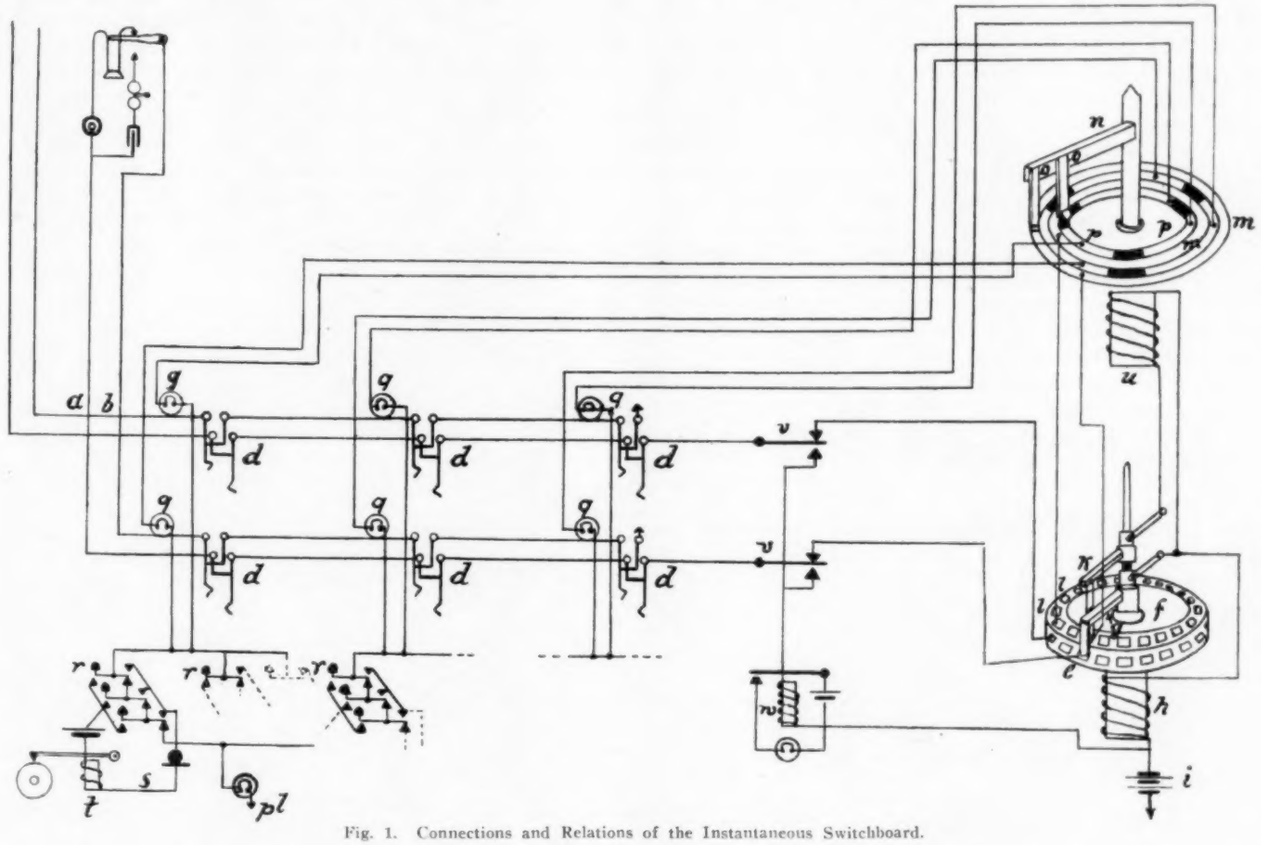


Fig. 1. Connections and Relations of the Instantaneous Switchboard.

The realization of the above points rests on the combination of three new principles. 1. The subscriber does not look for an operator by means of a calling relay which is working only a minute fraction of time in the day; rather the exchange looks for the subscribers that wish to call the exchange. 2. The calls, in a way made by the exchange, do not reach a certain operator, but reach any operator who happens to be free. 3. The distribution of the various calls to the different operators is not done by hand or by A-operators but is accomplished automatically. The application of the above principles is as follows:

current from the battery *i* to the metal rings *m, m*. From here the current is passed by means of the brushes *o, o*, insulated and attached to the rotating arm *n*, to the contact pieces *p, p, p*, which are insulated from each other; then to the call lamps *q, q, q*, and then to the answering key *r, r, r*. From here the current passes in series over the answering keys of the individual operators to ground in such a way that the operating of any one key at any operator's board cuts off all call lamps of all subscribers at this switchboard from ground, so that during the work of the operator with this one call no second call can reach her. A registering attachment is connected to the

answering keys of the operators, into the current circuit of the receiver or miprophone or in a special circuit *s, s, s* in such a way that with each use of the answering key the time and length of use is registered, so that no operator can misuse the keys and prevent a call from coming in at her board. Instead of the above instrument a clock can be connected, which will operate as soon as a call is answered and which rings a bell at the supervisor's switchboard after a certain interval of time. The operation is as follows: After the subscriber has removed his receiver off the hook, the current of battery *i* is closed over electromagnet *h*, arm *g*, of the switch *f*, contact *e*, *a*-side of the subscriber's line, subscriber's telephone, *b*-side at the moment, when the end of the rotating arm *g* touches the contact *e*. The electromagnet *h* is excited and keeps arm *g* on contact *e*. At the same time the battery *i* has been connected by way of electromagnet *u*, the arm *k*, the contact *l* to the metal ring *m*. From here the current passes to the metal piece *p* by means of the brush *o*. We can now have two actions occur.

Either the call lamp connected to *p* is grounded by any one group of answering keys, belonging to one panel, by way of the supervisory lamp *pl*, or else the ground connection is broken through all three operators being busy and having their answering keys in the calling position. In the former case the call lamp *q*, belonging to the metal piece *p* and to the calling subscriber, lights up, as is also the case with the supervisory lamp *pl*. The energized electromagnet *u* holds arm *n* and brush *o* in the position in which the metal piece *p* and ring *m* are connected. The call lamp *q* lights up, until an operator of the field in question through plugging of the jack *d* in question disconnects switch *f* and therefore electromagnet *h* from the subscriber's line. The latter is de-energized and releases arm *g*, which at once takes up its rotation and releases the current circuit between *g* and *e* and between *k* and *i*. Through the latter interruption the call lamp is extinguished and arm *n* is released, when the latter also takes up its rotation again. When the operator plugs jack *d* and uses her answering key *r*, she interrupts the ground connections, for her group of answering keys, of all call lamps, i. e. she is designated at all switches as being busy. No second call can reach her as long as she is busy with this call. If the latter case is in question, the arm *n* continues its rotation until a grounded lamp and consequently an open operator is encountered. The fact that at any one operator's place only one single lamp can light up, permits a new arrangement of lamp which takes very little room and allows more space for switchboard or other purposes. In addition this arrangement of lamps uses very little energy. During the quiet hours and at night the switches are not used. All the connections to the contacts *e* by means of the commonly moved switches *v, v, v* are broken and for them is substituted a common relay *w*, which calls up a common calling system. If a call comes in over this relay, the operator again makes the connections between switches and subscribers' lines by using a key, and the switches rotate until the calling line is found. If the connection has been made the switches and lines are again disconnected and connected to the common relay. The advantage in this system lies in the fact that in night service the entire calling lamp field need not be watched, since the calls come in on one field only.

Installation Costs.—The entire multiple jack field is reduced in size. All of the switchboards of the A-operators are saved. The cable requirement is the same as in a common battery exchange. The costs for call and cut-off relays and for the relay frames are saved. The intermediate distributing frame can be dispensed with, as the distributing of calls from very busy to less busy operators is eliminated. The battery equipment would be about the same as in the ordinary c. b. exchange, as the saving in current effected by the single call lamps is again eliminated by the current needed to operate the simultaneous switches. The elimination of distributing frames, relay frames, and the half of multiple switches makes a saving in space of about 20 to 50 per cent.

Operating Costs.—The operating costs as regards subscribers' lines and telephones are the same as in the old c. b. systems. The differences appear in the need for instruments and space and in the number of operators used. The first item, mentioned before, saves in operating expense as less work is required to keep the exchange in repair. As regards the operators, an exchange, the only one in a medium sized city, serving about 10,000 lines, needs 130 telephone operators. A distributing exchange of the same size needs 109 operators, of whom 36 are at the distributing boards. An exchange of the type described needs only 73 operators, as the 39 distributing operators are eliminated. The difference between this and the ordinary c. b. exchange is about 57. The actual saving might be even greater as the calls are evenly distributed over all the operators.

Operation.—In the Rotterdam exchange, using the distributer system, the distributing operator needs 7 seconds for a call, the other operator making connections in 12.5 seconds, a total of 19.5 seconds. As the arm *n* of the switch in the described system makes one revolution per second, every call reaches a free operator within one-half second. Every call in the new type requires 6.5 seconds less than the Rotterdam exchange. The question is whether the system works just as well during rush hours as during quiet periods. If there is a simultaneous switch for every group of 50 subscribers, we have, if the switch rotates once in 2 seconds, the following: In Rotterdam during the worst days with connections to the number of 6,680; 10,378 calls came in, or 1.5 call per connection. The switch would have to pass on 75 calls during the hour, allowing one switch for 50 telephones. As the time needed to pass on a call is at the most 2 seconds the work of the simultaneous switch requires only 150 seconds of the 3,600 seconds at disposal per hour. If the calls were to come within equal intervals of time, there would be 40 seconds between them. A delay of one call by another would be impossible, and the time passing between the subscriber removing his receiver and the exchange answering the call varies between 0 and 2 seconds. The average is one second. If 10 per cent of the subscribers were to remove their receivers at the same time, the last of these ten would be answered after a lapse of only 3 seconds.

Another point in favor of this system is the fact that no subscriber reaches the same operator more than perhaps two or three times a day; at any rate he does not reach the same operator consecutively. The result is that service becomes an impersonal matter. The operator has no reason to show partiality to any subscriber, not knowing who is calling; the subscriber cannot blame the operator for errors and become abusive or impatient with her and thus irritate her. The above are in brief the advantages of this so-called simultaneous switch system, which is equivalent to a saving both in operating and in installation expenses and in simplicity of operation.—*Zeit. f. Schwachstrom.*

WIRELESS TELEPHONY OVER GREAT DISTANCES.

L'Industrie Electrique brings a short article by Professor Vanni concerning wireless telephony over long distances. Wireless telephony has to deal with much more difficult features than wireless telegraphy. The latter has to transmit only a simple Morse code, while the former has to transmit as complex a phenomenon as the human voice, where we have not only fundamentals but also a large number of harmonics. We are to transmit these sounds without changing their strength or phases. Even in ordinary telephony over great distances this is difficult, let alone with wireless telephony. Vanni and Moretti have at last succeeded in telephoning from Rome to Tripolis, a distance of 1,200 km., using a little over 1 kw. for current. The receiver is any of the types used in wireless work. The principal difference lies in the transmitting system. A wave generator and a variator change the intensity of the antennae current corresponding to the sound to be transmitted. The generator differs from Poulsen's generator in that a so-called deflagrator is used for the arc, which is in series with a resistance and a self inductance and is fed by a direct current source of 500 volts. The deflagrator has two copper electrodes, of which the lower one (positive) is perforated and allows a stream of liquid to pass through at a certain pressure. The other (negative) electrode is solid. In shunt with both electrodes is the current circuit with capacity and self inductance, in which the waves are produced. The deflagrator, whose theory seems to be similar to the Wehnelt interrupter, produces 100,000 sparks per second. The frequency is therefore much higher than that of the sounds sent out.

In this way we obtain in the circuit antennae-earth currents of some ten amperes. As the ordinary microphones are only made for 0.5-1 amp. a hydraulic microphone is used, entirely different from that of Bell or Majorana. The principle rests on the flow of a liquid. A column of liquid of cylindrical form, falling with a certain pressure, is divided into three parts. The first part is clear and cylindrical. The second part, having a conical shape, has only a seeming uniformity. Investigations show that it consists of drops having a spheroid form. In the third part the division into drops is plainly visible. We have thus the phenomena of free vibrations, whose periods depend on the nature of the liquid stream. The flow can be influenced by mechanical means and the places of division between the two former parts of rays rise and then fall. The liquid cylinder in this way has a hydrodynamic vibration which is synchronous with the mechanical vibration, provided the latter is periodic. Such a liquid stream, consisting of a dilute sulphuric acid solution, falls upon an inclined platinum disc and is changed into a roller shaped stream. As soon as the stream vibrates, the resistance varies, and if the stream belongs to an antennae-earth circuit, which is traversed by oscillating currents, the strength of this current changes through the changing resistance of the stream, and the changed tones are transformed to changed emission waves. The microphone really has an oscillating or vibrating stream of liquid and an unchanging accumulator.

FAULT FINDING IN TELEPHONE CABLES.

Elektrotechnische Zeitschrift brings an article on a new instrument for finding faults in telephone cables. Fig. 2 shows the diagram for the instrument in question. Suppose there are two cables, one of which has a ground connection, which is to be located. To simplify measurement, at any desirable place the two cables are connected by means of a short circuiting wire A, so that we have an uninterrupted connecteion between B and C. The length of cable section may be taken at 250 feet, a total of 500 feet. If we send current into the cable, and measure from one end D to the other end E, and again measure the voltage drop between point D and earth, we have a relation between the two readings proportional to the lengths of the cable (total length) and the cable length from D to earth. The result can be controlled by reading from point E to earth. Both readings added should give the total length of the cable. Depending on the cross section of the cable, the current strength will differ very much, if the storage battery has an average voltage of 2. For that reason for measurements a storage battery of greater capacity should be used, so that from 10 to 15 amperes can be obtained. With very small cable resistances a resistance must be placed in the main current circuit in order to protect the battery against too great current removal. This resistance is easily chosen by using long connecting wires between battery and cable, or else using a wire of higher resistance, like iron wire.

As the diagram shows, the battery is connected to points B and C, whereas the voltage drop is read at D and E, where the cable length is measured. From here

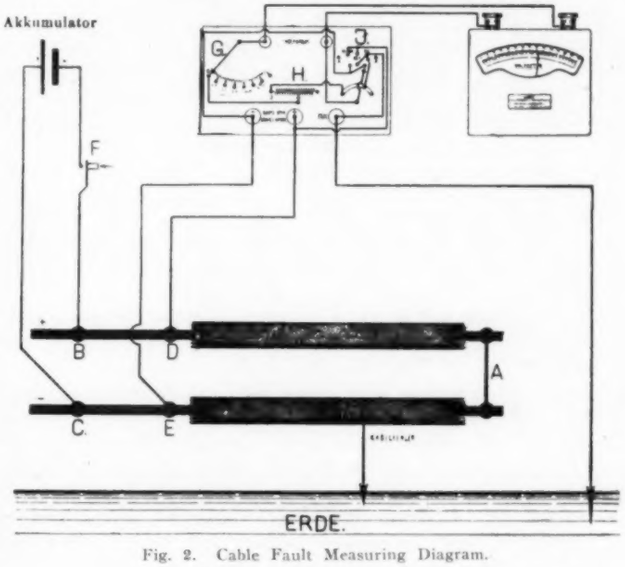


Fig. 2. Cable Fault Measuring Diagram.

thin wires lead to the terminals of the measuring instrument. The ground terminal of the same is connected to earth, for example, with the lead mantle of the cable. Any precision voltmeter of some 3 to 10 milliampere current consumption is connected to the proper terminals of the measuring instrument. In order to take current from the battery only when actually measuring, a key is placed in the main circuit at F. The key F is pressed down and the voltmeter shows a reading. Crank G and pointer H allow the voltmeter regulation. The switch J is now at the second contact cable "cable $\pm$." In this way any voltage drop is shown, regardless of the cable length, and this drop must be decreased, if the same reaches only over a section of the cable and not the entire cable. The relation between the two readings corresponds to the relation between the total cable length and the length to the faulty spot. A diagram furnished with the instrument gives the corresponding meter length to the voltage drop. We have now the cable fault from the $+$ end to the fault.

To verify the result, the switch is placed at the next contact marked "cable — to earth" and readings are again taken. The first value found previously, added to this second value, should give the total cable length.

PSYCHOLOGICAL EXAMINATION OF OPERATORS.

The experiements in psychology made by Professor Munsterberg of Harvard which he tried to apply to the selection of telephone operators seem to have found much favor with German telephone engineers, as the *Elektrotechnische Zeitschrift* claims. The psychological tests are divided into a number of component parts, each one of which is applied to some requirement necessary for efficient operators. Aside from the most important prerequisites, good eye sight and a sharp ear, also clear enunciation, Munsterberg mentions eight other requirements which he intends to use as bases for his tests. These are memory, attention, intelligence, accuracy, speed, power of separating certain numbers or pictures, accuracy in movements, power of association. The memory was tested by reading two four-digit figures to the students, and having them write the same down from memory at a given signal. The numbers were then increased to five, eight and even ten digits. Attention was tested by giving a newspaper to the girls and having them cross out every *a* or other letter in a given time. The time was kept in seconds, and after every second unit, the last *a* marked was indicated by a cross and after the end of the test the *a's* marked were counted. The records were taken in reference to the number per unit time. The intelligence test consisted in reading 24 logically connected pairs of words, and then in having the girls write down the corresponding word, when one of them was given. For example, the test might consist in reading synonyms or antonyms, as *pretty, nice, good looking, fair,* for the first set and *good-bad, large-small, white-black, old-young* for the other. If then the examiner mentioned the word *pretty* the girls would have to write down as many synonyms of the word as they could remember or else knew from experience. If the word *bad* was given, they would have to know at once that the antithesis of that word is *good,* etc. Accuracy was tested by having the operators divide a sheet of paper into four equal sections. Speed of movement was tested by counting the number of zig-zag lines that they could draw on a sheet in a given time.

So far the experiments could be made with a number at the same time. The next tests were made with individuals. Forty-eight cards were given to each girl and she was required to separate these into four different packs, each holding the same kind, within a given period of time. Accurate movement was again tested by having the candidate try to pierce three crosses on paper in front of her, using a pointed pen, keeping time with the beats of a metronome. This last experiment is of great importance, as it is equivalent in its scope to the work of the operator in plugging the jacks in the switchboard panels. For the association test the candidates were required to repeat any one or two words of a sentence spoken by the examiner, the girls not knowing why these sentences were pronounced. Perhaps a better test than the above might be the following: Show the picture of some known object which, of course, must be common to the experience of the girls. Objects might be pictures of a horse, a cat, a table, a telephone, a bell, and others. The pictures are shown only for a fraction of a second, and the girls are required to write down the names of the pictures shown. It goes without saying that the figures must be shown rapidly and that very little time can be given to the writing down of the names. The association is that the visual sensation is to call up immediately the name of the picture. In this way we test not only association and intelligence but also quickness of thinking and memory. All the results of the examinations are added together and the candidates are accepted as operators in the order of their ranks depending on these examinations. The above is a bare outline of psychological tests that can be made by any exchange manager and will eliminate the physically and mentally unfit candidates without further trouble. Not every person is fitted for an operator and such tests as the above will be of great help in obtaining good material and giving better service on the part of the telephone companies.

IMPROVING LONG DISTANCE COMMUNICATION.

In long distance telephone lines as also in lines spread over a wide area, even though not classed as long distance, telephoning is sometimes very difficult. These difficulties are due not only to the increase in damping coefficient in the subscriber's line, but also to the fact that the relation between the resistance changes in the microphone and the total resistance in the subscriber circuits varies, the former becoming too small. One remedy dies in changing the microphone current supply from the long distance exchange to the local exchange, and at the same time pupinizing the inter-office trunk lines between the two exchanges. In order to see how great an improvement can be obtained by these two measures, the Siemens-Halske Company made extensive experiments. The ordinary paper insulated cables were used for subscribers and for trunk lines. The conductors were of 0.8 mm wire. The inter-office cable was supplied with Pupin coils. For long distance lines was used either Pupin lines with a characteristic of Z= 2,000 ohm, or an ordinary overhead wire, or an ordinary telephone cable with increased self inductance. The damping exponent could be changed from 0.5 to 2.5 and 4.5. Results showed that for a cable length of 15 km. between long distance exchange and the subscriber's telephone, better results were obtained by feeding the microphone at the local exchange. Even better results under the same conditions were obtained by using Pupin coils on the inter-exchange cable. Increasing the battery voltage had no influence with lengths of km. cable, and only very little with 15 km. cables. Changing the microphone feeding battery and using Pupin coils gives the best results in every case, regardless whether the lines are cable or overhead wires.—*Telegr. u. Fernsprech Tech.*

Ruling on Fifty-Four Hour Law

Ruling was made by the Texas attorney-general's department in answer to a query by Acting Labor Commissioner Robert McKinley of Austin, Tex., that the fifty-four-hour law passed by the thirty-third legislature limiting the working hours of female employees, applies to women employed as operators in private telephone exchanges, providing such employees are working in towns of more than 5,000 inhabitants.

Reports made to the labor department by inspectors show that there is doubt as to the applicability of the act when operators working in private exchanges were on duty as operators for only a few hours a day, but the remainder of the time worked as stenographers or clerks.

Moving Pictures of Telephone Operation

By Harold D. Stroud

THERE is no logic more convincing than performance. If you have something to offer that permits of visual exposition the camera is your best salesman. The commercial world has paid tribute to the dry plate and the film in figures that would yearly equal the fortunes of our greatest kings of finance, and when the old fashioned dry plates failed to tell his story better than it could tell that of his competitor the manufacturer employed high priced artists to bring out the detail, smooth out the background and other ways make the product appear at its best, but it is beginning to be seen that the best that the modern art catalogue builder can produce fails to go the whole way, and represents but a part of the modern advertiser's campaign equipment.

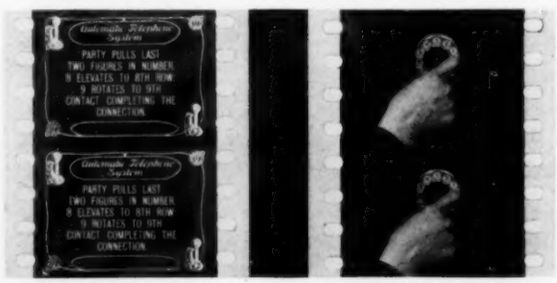
What appeals strongest to the human eye is not artistic repose, but animation. The eye craves action, and this factor forms the basis for the great future of advertising.

The motion picture has grown in a very short time from a form of amusement to a great medium of entertainment and instruction. The film producers, forced at first to economize in film picture subject, now can spend as high as a quarter of a million dollars on a single subject of a highly interesting and spectacular order, because hundreds of millions of people are educated to the picture show habit and are waiting to pay their nickel or their dime to sit out an hour's show and watch with undivided attention whatever may flash past them on the screen.

The wonderful possibilities in the film as a factor in education are already beginning to be recognized, and there is a growing demand for film entertainments in churches, lodges, clubs, conventions and schools.

The educational films of the industrial and scientific, also the topical class, will play an important part in the social center movement that is fast spreading from city to city. Many schools, churches and clubs now own their picture machines and film libraries or exchanges supply an unending list of subjects covering almost any class of entertainment from dramatic to scientific.

The industrial reels are few as yet but the future of this class of films is forecast by the success of some of


Automatic Telephone System
PARTY PULLS LAST TWO FIGURES IN NUMBER
9 ELEVATES TO 8TH ROW
9 ROTATES TO 9TH CONTACT COMPLETING THE CONNECTION
Automatic Telephone System
PARTY PULLS LAST TWO FIGURES IN NUMBER
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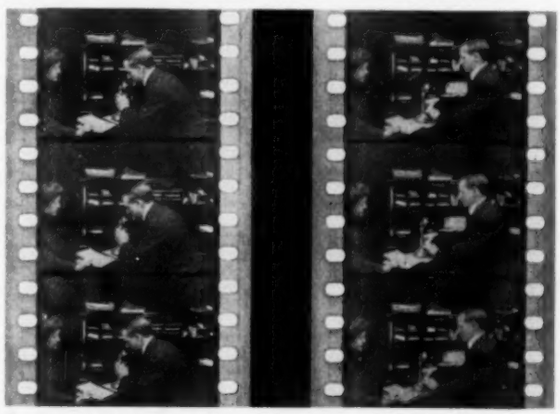
Working the Dial; Also One of the Film Titles.

America's greatest manufacturers, who use them as an important arm of their publicity campaigns. For instance, a harvester company has several highly paid lecturers who have advance bookings in hundreds of towns and farming communities throughout the world, and spend thousands of dollars per year on new pictures of their machinery in actual operation in the field. The eye of the moving picture camera studies every new piece of machinery and reflects it upon the canvas for the examination of the farmer in Canada, Russia, Argentine or America. It tells the story in a universal language and makes a convincing appeal to his buying service. It recognizes the requirements of the man from Missouri and satisfies it as no other form of advertising can.



Typical Office Scene, with the Automatic Telephone.

Every picture theater, school, club or church will at some near date furnish audiences for good industrial pictures showing processes of manufacture in such a way as to hold the educational element in the foreground and leave the advertising in the background, yet by delicate manipulation make it more forceful as an advertisement than if brought glaringly out.

A mere suggestion of the name of the maker of the product in a motion picture has greater advertising value than pages of newspaper space assuming that the same number of people see the picture and the paper. The conditions under which they see the picture are such that they must see the name or trademark and they observe it with undivided attention, also with a story so connected with it as to make a favorable impression upon the observer. Space in print must share attention with other ads and also with other objects that may distract the observer whose attention it is desired to attract.

Knowing the psychology of advertising, what better conditions could be found to make a deep and lasting impression of your trademark upon the mind of the buyer, than when his mind is relaxed and open to impressions, seated in a pleasantly arranged auditorium, nothing to share the attention, in fact with the whole show to yourself for the benefit of your subject? With good films well handled, you have reached the climax of advertising efficiency.

Color effects can be reproduced through the photo film that rival nature's most delicate tints and even with stereopticon slides where motion plays no part colors can be used to excellent effect in advertising.

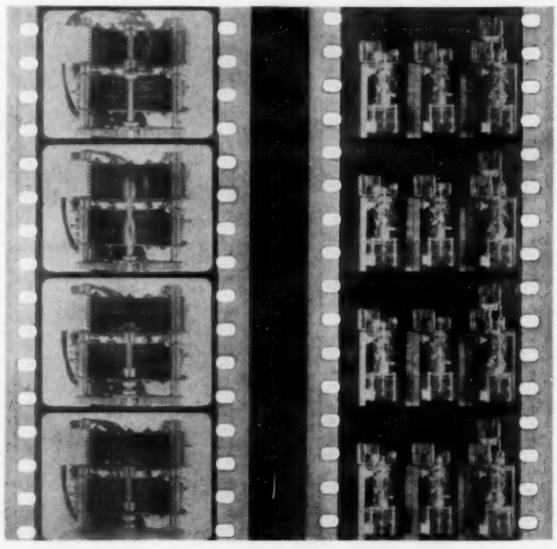
THE TELEPHONE IN MOVING PICTURES

Recognizing the value of motion photography as a means of showing the telephone, the writer in 1911 suggested to several producers of films that they use a certain

telephone in their pictures instead of showing some instruments they then had among their properties. They welcomed the suggestion and as a result thousands of moving pictures have been made showing the automatic telephones, sometimes used properly and sometimes not but easily distinguishable by the dial.

These pictures have gone all over the world, as impressed upon the writer during a visit of the Young Australia Globe Trotters to Chicago recently. When these boys were shown through one of the automatic exchanges in Chicago they recognized the instruments as those they had seen in the moving pictures at home in far-off Australia. Another case of recognition came from an Englishman visiting America, who had seen the telephone in the pictures at an entertainment which the King attended. He incidentally remarked that King George is very fond of moving pictures and by Royal order had his coronation placed on films so that future generations could see it, a repository for the negatives being provided in one of the castles.

In order to encourage the use of motion pictures in telephone publicity work the writer during the winter



Showing How the Automatic Switches Work.

evenings of 1911 worked with a friend in the business to make a picture possible that would show the evolution of an automatic telephone call. It was doubted by many to whom the thing was suggested, that the camera could show the rapid motion of the switches. It not only showed every motion but gave a much more perfect exhibition than could be had by studying an exchange in operation.

This picture shows a business man coming to his desk. He picks up his morning's mail and opens a letter, calls his stenographer by pushing an imaginary button on the end of his desk, starts to dictate, and strikes a snag. He makes a telephone call, picking up the directory and opening it, a close up picture showing him running his finger down the page to find the name. He stops at the name he wants and points to the number, which is 64-098, and turns the dial with his finger in 6. The picture then shows No. 6 or Plymouth Court automatic exchange, outside view, and the title says "The Call is now extended to the first selector in the exchange." Then the picture goes back to see the man pull the next number, 4; then shows the second selector in No. 6 exchange rise to the 4th level and notate to an idle trunk and stop. Title says "Call is now extended to the fourth thousand of this ten thousand line switchboard." Goes back and shows partly pull the 0 on dial, then shows the 3rd selector rise to the top or tenth level and rotate to find an idle trunk and stop; title then says "The call is now extended to the tenth hundred section of the fourth thousand of this ten thousand line exchange." The picture then shows the fourth switch or connector operate, rising after the 9 is pulled to the ninth level and rotating after the 8 to the eighth contact in the ninth level, when it stops and you see the ringing relay pulsate, with a spark each time, not noticeable when the picture was made, but showing up like a bright star in the picture. The next title says, "Call is now completed and called party's bell is ringing," and sure enough here comes the young man at the called telephone, swings his leg over the corner of a typewriter desk on which the instrument stands and answers. Picture flashes both parties alternately and they are both seen hanging up receivers, after which the calling party resumes dictating.

Thus far the pictures only show us one piece of apparatus at a time as we follow the connection through. But we are to see more. Next for novelty we see a closing view, entitled, "All Hands Around." This was a thought that occurred to us because of a party of ladies calling at the studio just as we were at work on this part of the picture. We let each one call 64-098 on the dial, passing only the hand—which shows up on the screen as big as a house—between two sheets of black cloth so that the effect is as a severed hand floating in space and turning the dial. The writer's little boy also took a turn with his chubby hand, and then we started on the second call which shows all selectors with the connector in one picture so that as the number 64-098 is pulled you see each switch in its turn respond to the impulses followed through by a stop-watch which indicates the exact number of seconds that have elapsed at each step of the call. This showed seven seconds to complete the connection, as the lapses between the turns of the dial were greater than in ordinary usage. Then we hung up both receivers, still showing the switches engroup to view the disconnect operation, which upon close examination of the developed film shows that it took three exposures, or in time measurement 3-16 of a second—there being 16 exposures to the foot with a film travel of one foot per second. This, by the way, is the only way that such small divisions of time in mechanical processes can be measured.

The first view shows all switches in suspension, the second shows a blur and the third shows all switches down. As a matter of fact the middle view is the only one showing action so that it might be said that the act of disconnection is only 1-16 of a second.

This much of the picture is the finale of a complete scenario, entitled, "The Romance of the Automatic," and was made first because the more difficult and vital to the success of the rest of the story. This complete picture has not yet been made, but it is the writer's intention at some time in the near future to complete it as a personal venture because it is reasonable to believe that almost every automatic exchange management would be glad to secure a copy of the film to use in publicity work.

The complete film will start at the beginning of the story and go through with every important detail, taking about two one-thousand foot reels of film. It will show the inventor of the automatic in his undertaking shop in Kansas conceiving the idea after having a rustle with the

girl operated telephone. Next it will depict the usual struggles of the inventor and finally his success. Here we leave the harrowing details of a blighted hope to the imagination of the spectator, and go on with the world to see the factory, the many exchanges, the different people whose burdens are lightened by the modern telephone —Chinese, Cuban, English, French, German, Brazilian, Australian, Canadian, American, to all of whom the language of the automatic operator is as the hopes of the Esparantist, universal, cosmopolitan, so long as he has a finger to turn the dial.

Then we see the education of the subscriber, and are reminded that even so simple a thing must be done right. We see a person trying to make a call with the receiver on the hook, and watch him cuss "the fool thing" because he does not get his party. But wait; a bright light strikes him, and the fool thing proves to be he who calls the other a fool, and all is well for he has learned one thing more.

In this way we will show and tell of the various pitfalls that await the learner, also how to avoid them and get good telephone service.

Thus we see in how many ways this picture may be of value—first, to entertain, and second, to instruct. The promoters can take the "Mountain to Mohamed" in his suit case and close the deal for his franchise while the city fathers are under the spell. Next he can visit the merchants whose coffers are full of four per cent bonds and presto! under the spell of the picture he has the mazuma. Now all he needs is the subscribers, which he promptly acquires for are not pictures made to see, and are not churches, schools, social centers, not to overlook theaters, and mass meetings good places to show the "most wonderful pictures in the world"?

The sample piece of film was loaned to John D. Wells, publicity manager of the Federal Telegraph and Telephone Company of Buffalo, and made a great hit.

By the way, good transparency slides offer the telephone manager an avenue for publicity. He can tell the people anything he wants to at the lowest possible expense. Twenty-five slides have been running in the best picture theaters in Chicago in trade for a four-party line telephone each, net cost about $15.00 per year, with the right to free admittance to the shows.

The Success of the Service Association

Opinions of Its Members

SO much interest, and in fact enthusiasm, has been aroused among the independent telephone operators of the country by the activities of the Telephone Service Association that a brief discussion of its present status will doubtless allay considerable curiosity.

The Telephone Service Association was organized October 16, 1912, at Hotel La Salle, Chicago. Its object, as the name indicates, is to give its members expert advice, without charge, on traffic, engineering and commercial subjects, thus promoting that good service which alone makes for the success of any operating telephone company.

The pages of TELEPHONE ENGINEER have recorded the progress of the Service Association from time to time, as new features developed. Its readers, therefore, are already well informed as to the purposes and activities of the organization. The latter is, however, still very young, and not all the independent operators have yet affiliated with it. Those who have not will doubtless be interested in some of the comments on its benefits by those who have.

For example, the secretary-treasurer of one of the most active state associations of independent operators has this to say:

> . . . I am going to suggest that you formulate some proposition and put it in writing, covering your affiliation with our association, bringing out plainly the benefits that would accrue. This will give me something definite to work on, and I will take pleasure in putting it through if possible, and it would seem to me that our advisory board must necessarily resognize the great work that your association is doing and its possibilities. . . . I consider the work that you have outlined for your association to be of the greatest help to the independent telephone companies of anything that has yet been launched.

The secretary-treasurer of an Iowa Independent says:

> Personally, I will insist on the company joining the Service Association.

The president of a large eastern operating company, one of the oldest and strongest independents, says:

> I want to compliment you upon the work the service organization is doing.

The following letter from the secretary and general manager of a centrally located independent operating company affords a concrete illustration of the kind of help the Service Association is prepared to give its members:

> Many thanks for your kind offices in the work and assistance you have given us. Mr. ———'s statement that for that class of service they are getting but $3.00 per year was noted with interest by my people; we have always gotten $5.00 and given county service free, but I have taken that privilege away and am still charging them $5.00 per year. I would like to meet Mr. ——— sometime and discuss this matter with him, on what basis they have figured the $3.00 rate and just what they feel it will cost them to handle this class of service.
>
> This town we want to improve is ———; and I will furnish the latest map of the town with the present cable and proposed and also all the extensions and betterments we are desirous of making, then you can turn this over to the engineering committee, and have them give us the specifications and cost of material and labor necessary to put this place in proper order.
>
> Pretty rotten, I guess, for the small company to have the opportunity to call on some of the best men in the country in our line and all for $22.50. . . . Better raise the fee or you will go broke.

Letters ordering and commanding the association's book of operating rules are, of course, reaching the manager all the time, and it is not necessary to reproduce any of them. The book, in fact, has proven its value and received universal recognition.

Communications like this frequently gladden the heart of the Service Association's manager, and may persuade others who have not yet done so to take advantage of its co-operation:

> We as a small operating company in Illinois feel that we are indebted to the Telephone Service Association for many things. We did not at the time we entered the association think or even realize the benefits that can be derived therefrom.
>
> We feel that the association is the "melting pot" of the telephone business in its entirety. Many questions arise daily in the small operating company that cannot be satisfied without some expert advice. This advice small companies are unable

to pay for at the rate asked by an engineer, or other person, who is qualified to give it, having many years' experience and a technical training. And we have found that every question asked has been duly cared for in plain language.

We also feel that this organization has but covered a small fraction of the work which it eventually can handle. It may develop into a medium whereby small companies may get good, competent help to care for their exchanges, and many other good acts can be accomplished.

Only a visit to an exchange of any company by the manager, Mr. Eldridge, would repay the small price requested for dues for the good he woulld do the employees by his wonderful manner and enthusiasm. What company can afford to withhold the price of membership, when it has the opportunity to hear W. S. Vivian, the man who put "T" in traffic, talk traffic to the operating force? The only thing is that we feel we are getting in too cheap for the good we are deriving from the Telephone Service Association.

Always welcome, of course, are letters like this one, from the manager of a materials inspecting bureau:

It may interest you to know that we are putting forward a check for $25 as an earnest of our belief in the future of your association.

The writer of that letter was interested to the point of writing four single-spaced pages of letter full of suggestions for the future consideration of the Association. Suggestions, indeed—and generally very good ones, too—are one of the evidences that the Association's members are putting real thought on its welfare.

Letters of this kind might be reproduced for page after page, if access were had to the files of the Association. The few from which extracts are presented, however, will suffice to show that those who have given the Association the test of affiliation are delighted with the results. To many of them, in fact, it is equivalent to hiring, not one, but a staff of competent, experienced engineers at a "salary" of a few cents a day.

With these facts in view, it is not strange that the Telephone Service Association is building up its membership at a very rapid rate. It is now preparing for its first annual meeting, which will be held the latter part of October, probably the 22nd, although the exact day is not yet settled. Notices of the meeting will, of course, be sent out as soon as the definite date is known. Every telephone operator who can possibly attend will find it well worth while.

Boy Operators Suggested

Boy telephone "girls," because of a confessed inability of the telephone companies to hire enough girl operators to give satisfactory telephone service, is declared by Mrs. Rose A. Constant, Ohio factory inspector, to be the first aid solution to the problem of good telephone service in Cleveland.

Mrs. Constant has just completed a thorough investigation of the working conditions of telephone operators. Besides finding that one of the principal causes of the bad telephone service is the lack of a sufficient number of experienced operators, she reports that operators told her the mechanical equipment had fallen into a state of serious deterioration and that even experienced operators in many instances could not give good service.

"Not alone in the telephone business, but in every line of business in which girls may be employed there is a scarcity of employees," declared Mrs. Constant.

"Employers contend that they cannot get girls who really want to work and who will give meritorious service. They declare they are constantly in the market for girl help and can't get it. They say the girls that used to flock to Cleveland from the small Ohio towns to obtain positions are not coming in the same numbers as formerly. It appears that the country girls have learned that the cost of living in the city is prohibitive as to the salaries they may expect to receive.

"Why not boy telephone 'girls'? It apparently is impossible to get enough girls, so it seems that the employment of boys on the switchboards is the only solution. It is dignified, necessary work, requires wits and is good training for a boy for pursuits he may take up in after years."

Mrs. Constant praises without stint the social welfare work of the Cleveland Telephone Company.

"Although the girl operators I interviewed appeared to be happy and contented with their positions," said Mrs. Constant, "I believe that if the operators were better paid a better class of girls would be attracted to the work and they would remain in it longer. The result would be better telephone service."

Mrs. Constant admitted that with too few telephone operators some of the girls were overburdened with work.

The working conditions of the operators are to be investigated by the state industrial commission, which has power to regulate wages, hours of work and other conditions of service.

Appraisal for Lincoln Company

To determine the accuracy of the appraisement made by the state physical valuation bureau on the properties in York county belonging to the Lincoln Telephone & Telegraph Company of Lincoln, Nebr., the state railway commission has consented to have a revaluation made by some outside engineer whom the citizens' committee, representing York telephone patrons, is to select.

This engineer, if satisfactory to the commission, will be appointed by that body for the special purpose mentioned, and the commission will pay him for his services. Chairman Clarke of the railway board said that it would spend $2,000 if necessary to secure the new valuation.

Mr. Clarke declared that he and Commissioner Taylor have full confidence in the engineers employed in the physical valuation bureau, but that since their figures have been challenged by the York people as too liberal to the telephone corporation, the latter would be given a chance to satisfy themselves by calling in an outside, disinterested expert.

The hearing of the York case before the railway commission was continued until such time as the new appraisement can be made. The understanding is that the York people will secure an engineer as soon as possible and he will then be put to work under the railway commission's orders. The commission will pay his salary and expenses while conducting the investigation. The Lincoln Telephone & Telegraph Company may ask the privilege of having some of its men accompany the engineer when he proceeds to inspect and value the properties.

Members of the York citizens' committee and their attorney, E. J. Clement of Lincoln, declared that the revaluation was what they wanted.

The committee will probably write to Senator La Follette at Washington and to Louis D. Brandeis at Washington, requesting them to furnish the names of competent and trustworthy engineers who might be secured.

The engineer who is chosen to make the valuation of York county telephone properties will be expected to do more than merely check over the figures of the state's engineers. His duties will be to view all parts of the plant, appraise the reasonable cost of each part and submit detailed figures, entirely independently of the valuation heretofore made.

The Lay of a Layman

By the T. E. Dopester

As Jack Kelsey would say: "I am writing this, far from the scene of battle, while I rush eastward over the Erie," or some other obscure piece of scenery. Jack does an immense amount of traveling to qualify as financial editor of a certain telephone trade journal. Just why "financial editor" is more than any of us can discover, but that matters little. Nearly everybody reads his stuff and I'll let it go at that. But without attempting to emulate Jack Kelsey—for he followed me—I too am rushing into the East where the maddening throng is thickest. And I'm going via the B. & O.—the road that leads to Washington—where I've never been before. I discovered the B. & O., did that when I was week-ending at Wawasee, this summer. The nation's capitol dome is etched in the windows, water bottles and silverware and it is woven into the car runners and linen—you are almost convinced that the B. & O. is ready for government ownership. It is a regular road at that and it will be more of a road when they finish spending the money that has been appropriated for improvements. The B. & O. doesn't seem to be alarmed about the Underwood-Simmons tariff bill at all. Probably that is because it carries so many senators and representatives and has some inside information. All along the right of way are tons and tons of new steel rails and thousands of workmen. A traveler never knows what is being done, but he is impressed with favor that something looking towards his comfort will follow.

* * *

Presuming that the train will stop at Washington and that the conductor will grant me a few hours layover, I hope to see the building with the famous dome that crowns the beautiful scenery of the Potomac. It will be Sunday when I get there and Edward E. Clement will have on his frock coat and be at church, and from the appearance of the sky it will also be raining; so I've a lonesome prospect. But it has been delightful since I woke up at Cumberland. The Pennsy and the Central haven't a blessed thing on the B. & O. when it comes to the view from an observation platform. I haven't any care what this river is that breaks through the mountains and gave the builders of the road a guiding hand to find the right of way, but its a great old river and those moss covered mats that lie out there are new to me. Even after old Senator Gorham stole the water to make the Chesapeake and Ohio canal, he didn't take all the splendor from that river. There are rock riffles and cataracts even yet, the like of which an inter-mountain man never saw. Then the great climax at Harper's Ferry is worth a tortuous night in a sleeper, because there never was anything just like it. Harper's Ferry was on the map before John Brown kicked up his fuss. Incidentally, so was the B. & O. Because it is so old, they are fixing it up—happy thought. But when you go east, my brother, take my advice and look over the scenery down from Cumberland to Harpers Ferry and get the full measure of the dissolving scene as your train drags you through a tunnel just after pulling away from John Brown's grave. Nothing to do but close your eyes on a sweet, never-ending memory picture. It is here that two great rivers merge into a larger one, and you are carried across them high in air, to be swallowed up in a mountain. The town, built upon a rocky hill, covers all the point which separates the rivers. If I could paint I would go back there and make that one.

* * *

Travel never helps the Lay of the Layman. He will never improve unless he sticks close to his work. The block system and the telephone system are responsible for my safety. "Safety first" is the slogan of this road, which promises to set me in a strange land. I will walk down Pennsylvania avenue because that is the only way I can live with my fathers. That's the way the greatest of them did it. I'll bet Taft never walked it in his life. If he ever navigated the capitol steps it was a vaudeville act! But when you walk you get close down to things, so I'll walk—maybe all the way to the White House, and from there to the monument. I'm told the round trip from the station isn't much less than four miles, and what's four miles after twenty-four hours in a train of cars?

* * *

After Washington, through more new country until Philadelphia, and then the old stuff. Try it when you go east again. This isn't advertising—it's good dope for the poor, tired, fagged, addlepated business man who craves diversion as a substitute for rest You rub your brow and look at your tongue and gouge your eyes and complain of losing your punch, and then you seek diversion. The McFaddens and the McLaughlins charge you $100 for physical culture lessons—work you to beat the band for an hour at $5, and make you like it. It is diversion. Why not rest a bit? You save three dollars by way of Washington. Give your gizzard exercise, and shake the barnacles off your appendix. Go east once via the B. & O. It's great.

* * *

I am going to be away from the Chicago office for two whole weeks, just as if that will make any difference. Two weeks in a lifetime doesn't matter. I'm getting old enough to know that. When we are twenty, time is a laggard. It is the unimportant thing. As we get on in years, we know better. These two weeks ahead will never be missed by this time next year.

* * *

Maybe I'll open another office down in little old New York. I've always had a mania for a New York office. I tried it two years ago, you may remember. Leased a place in the Hartford building, Union Square. Occupied it, as an office, for seven months, and then shipped the furnishings back to Chicago. Went right along paying rent on an empty room for eleven more months. I won't be so foolish this time. You can't teach all babies to stay away from fire. One burn isn't a lesson. New York is a big territory, and it is quite in evidence on the telephone map. I believe Telephone Engineer should be in the center of things all the time. Chicago is a geographical center, but by having two offices there is no escape. Besides, our friends from the West ought to find a welcome in the East when they go there. If you are interested in knowing how this has been settled, read this number carefully for further details.

* * *

New York is a great little place. I'm getting to be

a regular committee. It is the one place in the world where you will find lonesome folks. People who live there are always lonesome, and the visitors are vastly more so. The first time I ever saw the place I walked from the old Grand Central Station to Broadway and Forty-second, and from there to the Battery. Since then I've been pretty well acquainted with the town, and have been trying to have the town recognize me. But it takes patience. New York never hurries. Men get down to their desks at ten, sometimes; leave for luncheon at eleven forty-five; hang around a French bill of fare till three, and beat it for home at four thirty. They have to do it that way, for they live away over in Jersey, somewhere, and to make it for an early dinner, and dress for the theater and get back to Broadway by eight fifteen is the busiest part of the day. Then after the show, it's bad form to pass up the restaurants, and it's two or three a. m. when you find the covers. New York is exactly like that—or at least the men I want to see are, and that's what I go there for. I have to see these men. What's more, during the summer they never show up on Saturday! Which shows how perfectly backwoodsy we are in Chicago. Here we dock ourselves if we are not through with the day's mail at nine o'clock. We take as much as twenty minutes for lunch and grind right through till five thirty before we go home to stay. When we go to our clubs, the doorman never knows us unless he gets the tip from the financial secretary. The two towns are very much unlike.

* * *

While I am not trying to establish a record for pedestrianism, I have taken other walks about New York. One of my rambles begins at One Hundred and Forty-fifth and Riverside Drive, and follows the Drive to Grant's Tomb. Grab a green bus for Seventh avenue north; a crosstown car going west, and walk two blocks to the Hudson for the start. It is a restful hike when you're lonesome. You cross one of the biggest viaducts in the world. New York built it to give a lot of dock yard privileges to Tammany pets, but now that it is done, nobody cares. There are bronze tablets at either approach that say: "Riverside Drive Viaduct, erected according to plans approved by the Board of Estimate and Apportionment pursuant to Chapter 665, Laws of 1897, under the supervision of the Department of Highways." I was careful to get it all down on one of my trips, because it is typical of New York's way of doing things. Observe again what the tablet chronicles. When you see a New York advertisement in this paper, think of that bronze plate. I can't go into Jones' office and get his contract. Jones is a fine chap—plenty of time—but he will have to confer. I see him again and again, and I'm "stalled." Then I must find Brown and Smith and Johnson. When I know 'em all, they refer to next year's appropriation! Can you imagine what that viaduct must have cost? But I like it, because the part for footmen was made by somebody who knew what to use. It feels more nearly like a clay path in the country than any other stuff I ever trod. It is the only spot in New York where your feet find joy.

* * *

This isn't a telephone department. I find that telephone men are not crazy for that sort of thing all the way through the book. Sarah Elizabeth proved it. But last month I drew complaints from several quarters when I attempted to say that we needed managers of system with more ambition. One of these objections was written with a typewriter on three-color stationery and begged to know what sort of dope I had been taking. I was invited to come over and look the plant over. My dope was bad. And then I looked back at the letter head to discover: "Capital, $1,000,000. Zowie! I was talking about the average exchange in the average town—the one that uses order blanks, sometimes, provided they came with the catalogue—but never a two-thirds sheet in two thousand lots and three colors. No, indeedy, my dope was all right.

* * *

Since I sang my last song I've been away up in Wisconsin, where the pole leads were just as bad as they could be. Even in a cedar country they use a crooked pole because it is more convenient than a straight one. Darned little pride in the average country construction crew; too little care on the part of the foreman of the job. Incidentally, I stopped over night in Eau Claire, the place where the alderman went on record against two systems. I'll bet there is a lot of free telephones under that Eau Claire franchise.

* * *

However, scenery and the swaying of a train isn't conducive to thinking along a groove or writing on a line. I was wondering how people in this kind of country got along before the telephone came along. When right out there, nearly within reach, we passed a canal boat drawn by two mules, tandem. There was some washing on a line; Bill's gingham shirts and Bessie's day-after-tomorrow's frocks, and there was mamma fussing around with the breakfast dishes. Think it over! This canal is full of traffic—all drawn by mules, tandem fashion. There is opportunity for other Garfields! Why should a telephone be brought in here, where they stick to traditions? When a house wears out they let it go on and fall down. It is easier to build another. Instead of paint, whitewash is the tonic. And, then, you noisy farmers of the great Central Western plains, you, too, take this trip and have a look at the fields. Unless you were a farmer you'd know they were stone quarries. And this is the country men fought over for our freedom!

* * *

Lounging about the club car, I hear a general complaint of poor business, representing various lines. The telephone is proving the exception. This will be the biggest telephone year ever recorded. The makers are not complaining. The tariff has no terrors for them.

* * *

But as I near New York I must be pardoned for thinking of New Yorkers—those of them who are very rich. Those of them who build great marble piles for homes, and then shut them up for the summer, barring the doors and windows with ugly unpainted boards. I can't imagine folks of that kind using the regular telephones. Do they make 'em of onyx or sterling silver or solid gold? There's a market for that kind. The Bell Company of New York is making a mistake. They should make fancy stuff and have big department stores. Do it like the N. Y. Edison does. Get the money. The regular Bell desk type must be common stuff in a rich man's home.

* * *

Goodness, gracious! If I do decide on that New York office, I'll have to have a telephone. Then, of course, I can tell you first hand how rotten it is compared with Chicago. I remember when I was up against New York Tel. before, how they did me up in zones. About all the good you get out of a telephone in New York is the incoming calls. It lists you in the directory and gives you a little circle that's yours at so much per

month. If you want somebody in the Bronx or in Brooklyn, you pay toll. Everything on the monthly bill is plus.

* * *

Which recalls to my mind how kind New Yorkers are to the New York Telephone Company. All the swells are moving to Riverside Drive. Only a few years ago there was lots of space vacant before you got up to Grant's Tomb; nowadays it is all built solid up to and miles beyond. Great apartments; fierce rentals and easy telephone installations. If New Yorkers would cross to New Jersey they'd find more room; green grass; a place to romp out doors and get the same view of the Hudson, but out of the other corner of their eye. Then the telephone company would have to lay cables under the river and distribute wires overhead, and find a condition brought back that would refer them to the front pages of the blue print books. Give me the New York telephone franchise, and you can have the rest, because the New Yorker stands for anything. He pays, but rarely ever fights back. He refers it.

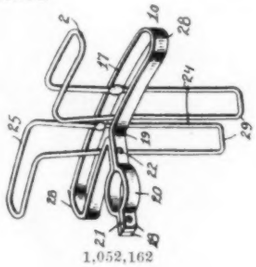
Recent Telephone Patents

By David S. Hulfish

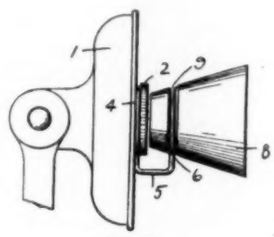
PATENT No. 1,051,271. Signaling System. Harry O. Rugh, Sandwich, Ill., assignor to Sandwich Electric Company, of same place. The system shown is a selective signaling system for "private lines," that is, lines which are not connected with an exchange switchboard and controlled principally from the switchboard. A main battery is placed at one of the stations upon such a line and each station upon the line has a stepping device for receiving call signals, and a key or similar device for sending call signals. The selection among the several stations is accomplished by a predetermined number of taps of the key at any station, the key being held down upon the last tap of the series to give time for the proper operation of certain slow-acting ringing and releasing magnets as described in a recent prior patent to the same inventor.

1,051,611. Directory Attachment. Edward McGough, Wapakoneta, Ohio. A stiff metal band is bent first into a horizontal loop and then into a clamp to grasp the column of a desk telephone. A pair of vertical wire loops added to the horizontal loop combine with it to form a pocket to hold the directory book or memorandum paper pad.

1,051,894. Supervisory Telephone System. A. E. Keith, Hinsdale, Ill., assignor to Automatic Electric Company, Chicago, Ill. The system of this patent provides means for supervising a call in its progress through an automatic switchboard. A monitor telephone or signal device may be connected with each calling line and kept in connection through the progress of setting up the desired connection, and may be disconnected before the called line is reached.



1,052,162



1,051,611

1,051,989. Harmonic Party-Line Telephone Ringer. C. J. Erickson, Chicago, Ill., assignor to First Trust and Savings Bank, trustee, Chicago, Ill. (This application filed 1906.) The striker arm and flexible reed are made in one piece and attached to the permanent magnet. The armature is adjustably attached to the striker arm.

1,052,162. Sanitary Telephone Mouthpiece. John McCausland, Providence, R. I. A bracket is made for the transmitter head to hold the mouthpiece funnel, and the funnel itself is made of paper or any cheap stuff, to be destroyed and replaced with new at frequent intervals.

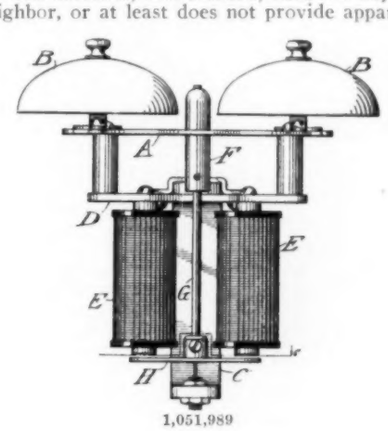
1,052,443. Receiver Holder. Antoni Orzechowski, Stamford, Conn. Two bands, one of which clasps the column of a desk stand the other of which clasps the receiver, are adjustably connected by simple mechanical members.

1,052,582. Telephone Directory. C. F. Henderson, Madisonville, Ohio, assignor to The Kemper-Thomas Company, Norwood, Ohio. A directory attachment of small size adapted to hang by a loop over the transmitter funnel, and to be supported rather rigidly by bracing against the front of the transmitter casing.

1,052,989. Coin Collecting Device for Telephones. Richard Yearneau, Clark, S. D. The device is designed for coins of various sizes and gives an electric signal upon the telephone circuit for each size of coin.

1,053,048. Selective Telephone Calling System. Oscar N. Lindsey, Senatobia, Miss. This system employs the "sectional line" in which the line wires of the party line are not continuous from the central office to all stations, but in which one of the line wires runs from the central office to the first station and there passing through the apparatus of the station telephone continues as a second section to the second station, and thus through all of the stations of the line. In sending signals over such a line, the first signaling current operates a magnet at the first station only; the second signaling current operates a magnet at the second station only, and so on until the desired station is reached, when the signal bell may be rung there and conversation may ensue.

1,053,340. Detector for Party-Line Telephones. John W. Nilsson, Balfour, N. D. When a telephone line runs through a rural community and branches to a number of telephones in houses of people who are neighborly, it might seem that the neighborly conduct would extend to the use of the common telephone line. The inventor, Mr. Nilsson, does not object to listening by a neighbor, or at least does not provide apparatus to prevent listening by a third party upon the line when in use by two, but he provides apparatus by which the third party is caused, as it were, to knock at the door before entering, and to announce his name in a loud voice. Within the case of each telephone there are placed the three items of a special telephone transmitter, an electric buzzer, and a circuit-closing device for the circuit of the buzzer. The circuit making device comprises a wheel with contact studs, and these studs are arranged differently in all the different telephones of the line to give different combinations of long and short buzzes. The wheel is started whenever the telephone is taken from the hook and the code signal of buzzes must be sent upon the line whenever the telephone is lifted. This, if the line be in use, announces to the users the identity of the station which now is listening to their conversation.



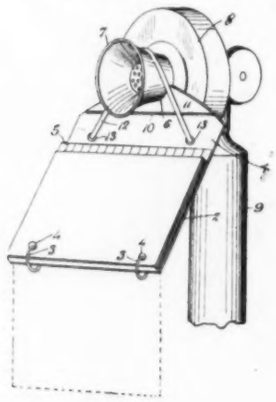
1,051,989

1,053,584. Signal Transmitter for Selective Signaling Systems. Vernon Durbin, Brookline, Mass., assignor to Holtzer-Cabot Company, Brookline, Mass. The device of this patent is for use at the central office switchboard in connection with step-

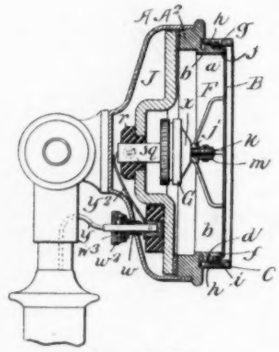
by-step party lines. A source of pulsating current is used and a ratchet or stepping wheel gauges the number of impulses sent to the line, according to the adjustment for the station desired to be called. When the gauged number of impulses has been sent, the polarity of the impulses is reversed.

1,053,682. Expansion Bolt. C. B. Van Antwerp, Chicago, Ill. An expansible, one-piece, non-threaded shell has a cone at the inner end for expanding the shell and a screw into the cone acts at the same time to draw the cone, to expand the shell, and to hold the attached apparatus.

1,053,684. Earthing Clamp. John C. Vogel, Philadelphia, Pa. A device for clamping an electrical terminal upon a pipe without permitting the clamping screw to injure the pipe. This is accomplished by having a movable part to clamp the two ends of a flexible strip of metal which has been passed around the pipe, and by having an enclosing part which bears upon the flexible strip and upon the pipe, and into which the movable part is drawn by a screw, thus drawing with it the end of the flexible metal band and tightening it upon the pipe.



1,052,582



Reissue 13,533.

1,053,849. Automatic Telephone Pay Station. Walter Milford, Syracuse, N. Y., assignor to Geo. C. Yokum, Scranton, Pa. The coin collector is of the type in which a coin is dropped into a slot and gives audible signals by striking bodily against bells and gongs. In this improved device, a circular wall is provided with the required number of spirally arranged coin guideways in it.

1,053,864. Automatic Telephone Exchange System. Josef Peticky, Konigliche Weinberge, near Prague, Austria-Hungary. While Mr. Peticky calls his patent one for an automatic telephone system, it appears that the United States patent office has limited his claims to improvements in an automatic telephone switch or selecting device. The switch is of the general nature of a "Strowger" type of switch and comprises a field of fixed points, a set of movable points, ratchets for moving the movable points to any set of fixed points by two movements, first vertical and then horizontal, and magnets for driving the ratchets.

Reissue Patent No. 13,533. Telephone Transmitter. Felix Gottschalk, Sterling, N. J., assignor to Gottschalk Waterproof Sanitary Transmitter Company, New York, N. Y. (Original patent No. 977,616, dated Dec. 6, 1910.) The novel feature of the claims is found in the diaphragm clamped around its edges and unperforated for the customary central stud, the connection between the diaphragm and the electrode of the corbon cell being by means of a part which is wholly inside the transmitter casing and which presses upon the diaphragm at points between the center of the diaphragm and its edge.

1,053,997. Telephony. Morton L. Johnson, Chicago, Ill., assignor to Corwin Telephone Manufacturing Company, Chicago, Ill. In the language of the patent, there are provided electromagnetic means for excluding the operator's telephone from circuit, further means governed by the listening key for partially controlling the excluding means, and then still further means controlled by connected lines and cooperating with the listening-key means, to exclude the operator's telephone from connection with an established circuit. However, in the language of mere man, if the operator tries to listen upon a conversation, a relay shorts her telephone and she really cahn't do it, you know.

1,053,998. Telephone Meter System. Morton L. Johnson, Chicago, Ill., assignor to Corwin Telephone Manufacturing Company, Chicago, Ill. One method of counting the number of telephone calls made by any telephone is to place a counting device at the telephone and then introduce into the telephone service in some way some condition which will require the user of the telephone to operate the counting device before he is permitted to hold a conversation with a called and connected telephone. In this patent, the connecting cord circuit is equipped with a total of seven relays so related in their contact points and windings as to produce the following results: When the called telephone answers, the calling telephone is switched to a circuit connected with a phonograph or tone circuit which the calling telephone user recognizes as the proper signal requiring him to operate his counting device. He then operates his counter and in so doing places an earth connection upon his line from the phonograph or tone and connects it instead to the line of the called telephone, after which, conversation may be held.

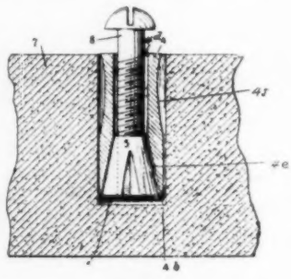
1,054,176. Party-Line Telephony. Elmer R. Corwin, Chicago, Ill., assignor to Corwin Telephone Manufacturing Company, Chicago, Ill. This party-line improvement is recited as being particularly adapted for automatic exchanges. The telephone and call-sender circuit is taken through the back contact points of a relay armature, the relay being so arranged that if the line conductors be without potential when the telephone is lifted from the hook the relay armature will not be operated and its closed back points will connect the telephone to the line wires and permit the operation of the call sender, while if the talking conductors of the line have a potential for conversation before and when the telephone is lifted from the hook the relay will be operated and locked until the hook be depressed, preventing the telephone from reaching the line, and preventing any effective operation of the call sender.

1,054,275. Telephone Switchboard. P. C. Burns, Chicago, Ill. The inventor pertains to the manner of providing for the night-alarm circuits, by which a jack when placed in the switchboard automatically engages the night alarm conductors.

1,054,465. Telephone Directory. John Sontheimer, Lincoln, Nebr. A number of cards are pivoted at a point and have a projecting label by which any card may be selected and turned on its pivot to render its written surface visible without detaching it from its pivot and without disturbing the remaining cards. In design, the cards are made circular and the complete directory is cylindrical.

1,054,559. Fuse Box and Relay Protector. Thomas Benton Jones, Dome, Ariz. The invention of this patent is found in the specific mechanical arrangement of parts within the containing box or cabinet.

1,054,581. Telephone Transmitter. William Marchant, London, England. The inventor sets forth the shape of a new mouthpiece or funnel for collecting sound upon the transmitter diaphragm, in the following words, which describe very accurately



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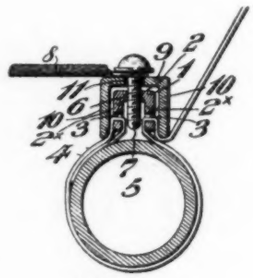

1,053,684

the true invention of this patent over the similar things which have gone before it: "A telephonic transmitter comprising a casing containing a horn or mouthpiece, having the shape of a paraboloid of revolution with the end part cut away so that the rear edge of the horn terminates approximately in the focal plane of the paraboloid, a diaphragm fixed approximately in the focal plane of the paraboloid and contiguous with the said rear edge of the horn, a series of removable sound graduating screens, and means carried by the casing for securing the screens one at a time over the large end of the horn.

Convention between Belgium, France and Switzerland is about to be signed for the establishment of telephone communication between Belgium and Switzerland. The principal telephone line will pass from Brussels, by way of Nancy, to Zurich.

The Law and the Telephone

By E. J. Wenner

TELEPHONE LINES ON STREETS AND BOULEVARDS—RIGHTS TO USE STREETS—RIGHTS OF ABUTTING OWNERS—TRIMMING OF TREES—DAMAGES FOR INJURY TO TREES.

THE St. Paul Realty and Assets Company owns a considerable amount of property in the city of St. Paul, Minnesota, and it brought action against the Tri-State Telephone & Telegraph Company, claiming damages for the injury to certain trees cut back and trimmed by the defendant company in order to prevent interference with their telephone wires. The plaintiff claims that the defendant was negligent in constructing and maintaining its lines and allowing them to come into contact with the branches of plaintiff's trees causing the destruction and injury of many of the branches.

The defendant claimed that it had the right by law to maintain its lines on account of statutory authorization, and that it was only subject to municipal police regulations.

The Supreme Court of Minnesota has already determined that a telephone line in a highway is not an additional servitude. It has also been decided that a license to construct a telephone line is not exclusive, and that the rights of the company must be considered in connection with the abutting land owners. Both the company and the land owner may have lawful right to occupy the street, thus a question of relative rights arises and neither must exercise his right as to interfere with or impede the other.

The question of tree trimming and injury to shade and ornamental trees has been so often discussed by courts and telephone writers that the writer deems it very important, and on that account a portion of the opinion rendered by the Supreme Court of Minnesota is quoted herewith.

With reference to the relative rights above referred to the court used the following language:

The duty devolves upon the company to construct, maintain, and operate its lines with due regard to the property rights of those who own and occupy lands adjacent thereto, and who also have interests in those portions of the road or street occupied by both. This principle had been applied most frequently to the trimming of trees, and the decisions are practically unanimous to the effect that, without regard to the question of additional servitude, the trimming must, if practically possible, be done in such manner as not to injure the trees. Wyant v. Central, etc., Co., 123 *Mich.* 51, 81 *N. W.* 928, 47 *L. R. A.* 497, 81 *Am. St. Rep.* 155; Tissot v. Great Southern, etc., Co., supra; Van Siclen v. Jamaica Elec. L. Co., 45 *App. Div.* 1, 61, *N. Y. Supp.* 210, affirmed 168 *N. Y.* 650, 61 *N. E.* 1135. "While the rights of corporations will be recognized," said the court in the Louisiana case cited, "the obligations under which they are placed, to respect those of others, must be enforced." It may be mentioned in this connection that in Louisiana a telephone line is not deemed to be an additional servitude, and the abutting owner does not own the fee in the street. See Irwin v. Great Southern, etc., Co., 37 *La. Ann.* 63. Telephone lines are erected both before and after boulevards and adjacent premises have been improved by the planting of trees, but in either case the correlative rights, duties, and obligations of the parties are measured by the rule stated.

In the present case plaintiff was the owner of the fee in the boulevard upon which its premises abutted, and where defendant erected and maintained its line, subject only to the easement of the public in the same as constituting a part of the street. Souther v. Northwestern, etc., Co., 118 *Minn.* 102, 108, 136 *N. W.* 571. Nor was the planting and maintaining of shade trees on the boulevard in itself unlawful, and if defendant unjustifiably invaded any right of plaintiff in this connection it is liable for the resulting damage. On the other hand, the court charged that under the circumstances disclosed defendant was lawfully upon the street in front of plaintiff's premises, and had the right to erect its poles and string its lines and occupy the place that it did occupy on the boulevard. This must be taken to be the law of this case, and in order, therefore, to sustain a recovery, it must appear that defendant owed plaintiff the particular duty allaged to have been violated, and (2) did in fact violate the same, (3) the breach was the proximate cause of the injury, and (4) damage sustained therefrom. Thompson on Neg. § 3; Street's foundations of Legal Liability, 93; Shear. & Red. Neg. § 8. Plaintiff claims that all of these elements were established, while defendant contends that none were.

The evidence was sufficient, if believed, to warrant a finding by the jury that defendant's system, where it passed plaintiff's premises, was erected on poles 60 feet high, from which were suspended 52 uninsulated wires hung upon 5 cross-arms below which a number of wires were incased in a leaden sheath supported by a taut wire fastened to the poles. The wires, unsupported except as stated, passed through and came in contact with plaintiff's trees, some of which were located within the property line and others on the boulevard, and all of which had been planted and were growing when defendant came upon the latter. Under these circumstances, which existed for several years prior to the alleged claim of loss, the swaying of the wires abraded the bark, thus causing constant loss of sap, which, together with electrical discharges from the wires and the weight of the cable resting on the branches, injured or destroyed the trees. It is true that the testimony concerning injury from the electrical discharges is unsatisfactory; but defendant's evidence in this regard cannot be held conclusive to the contrary, and the only province of this court is to determine whether the inferences drawn by the jury are sustainable. Said the court in Evans v. Gas Co., 148 *N. Y.* 112, 115, 42 *N. E.* 513, 30 *L. R. A.* 651, 51 *Am. St. Rep.* 681, which was an action for injury to trees from gas escaping from a main laid in the street: 'If we admit the possibility of an inference from the evidence that the injury to plaintiff's property was from the causes alleged, there is no difficulty in sustaining the recovery upon the principle of law above alluded to"—referring to the rule that defendant "was bound to use its rights and to conduct its operations so as not to inflict injury upon neighboring property."

It also sufficiently appears that the use of the cable was merely for convenience, and that if due inspection had been made the probability of loss would have been discovered; it appearing that in the inspection made the company was unmindful of plaintiff's interests. Plaintiff was not bound to anticipate that defendant would so conduct its business as either to injure or destroy his property, and no effort appears to have been made by defendant to avoid or minimize plaintiff's loss. Nor can we say as a matter of law that such would have occurred if defendant had exercised due care. We hold the evidence sufficient to sustain the verdict.

It will thus be seen that the Supreme Court of Minnesota has considered the proposition involved in the case mentioned, and the property owner is protected to the extent of his damages.

St. Paul Realty & Assets Company v. Tri-State Telephone & Telegraph Company (Minnesota), 142 *Northwestern Reporter*, 807.

PHYSICAL CONNECTION—PENALTIES AND FINES FOR REFUSAL—SUIT TO COMPEL CONNECTION.

The complainant is a telephone corporation having its chief office at Morristown, in Hamblen county, Tennessee, with lines running into various surrounding counties. The two defendants are likewise telephone corporations, the first named having its chief office at Knoxville, with lines running through Knox county, and into various other counties; the second named has its chief office at Jefferson City, in Jefferson county, also with outrunning lines.

The complainant, prior to the present litigation, constructed an extension of its line from Morristown to within one mile of Jefferson City. From the latter point the Citizens' Telephone Company extended its line to meet complainant's line, and so the two were connected. The Citizens' Telephone Company is also connected at Jefferson City with the People's Telephone and Telegraph Company, but the latter is not connected with the complainant.

The purpose of the present bill is to compel the two defendants to make an electric connection at Jefferson City between the complainant and the defendant People's Telephone and Telegraph Company through the Citizens' Telephone Company, so as to give to the complainant the benefit of the lines of the two defendants, in order that any patron of the complainant on any of its lines can, through the switchboards at Morristown, Jefferson City, and Knoxville, talk with any person he or she may desire on the lines of either of the two defendants; that is, to secure for the complainant the effect of a consolidation of the three lines.

It appears from the bill and from the evidence that there is an operating agreement between the two defendants for an interchange of business whereby each can use the lines of the other at an agreed rate for messages or conversations; the rate fixed for a conversation of five minutes from Jefferson City to Knoxville being 10 cents. The complainant insists that on the payment of this rate it is entitled to have its lines connected with the two defendants, to the end that it may use the line of the People's Telephone and Telegraph Company into Knoxville, and all other points served by that company.

It appears that patrons of the complainant living at Morristown and other points served by the complainant's line called the exchange at Jefferson City for the purpose of conversing with parties at Knoxville, but that the Citizens' Telephone Company, under the direction of the People's Telephone and Telegraph Company, declined to make their required connection with the latter, although complainant tendered 10 cents for each message so offered and refused. The service was offered to the complainant of having its messages transmitted or repeated to Knoxville, but this was refused, complainant insisting that it had, under the law a right to a through connection with Knoxville over the defendants' lines, so that one could talk directly from Morristown to the desired party in Knoxville.

It is insisted on behalf of the complainant that it is entitled to the right claimed, under sections 10 and 11 of chapter 66 of the Acts of 1885. It also insists that, inasmuch as the Citizens' Telephone Company is accorded by the People's Telephone and Telegraph Company the right to use the lines of the latter into Knoxville, a refusal to permit to complainant the same right on the same terms is an unlawful discrimination, and in violation of the common law as well as the statute.

Section 10 above referred to provides that telegraph and telephone companies must transmit over their wires messages and dispatches to any individual, corporation or other telegraph or telephone company at the usual and customary prices and without discrimination. If there is a refusal to so transmit, or if there is discrimination, the said companies are liable to a penalty of $500.00 for each such refusal or discrimination.

Section 11 provides that all persons or corporations are entitled to the same privileges, provided they comply with the reasonable regulations of the telephone or telegraph company, and that no condition shall be imposed upon one which is not alike imposed upon another, and for each violation of this statute any telephone or telegraph company is liable to a penalty of $100.00.

The defendant claimed the sections in question to be unconstitutional and void. The court had on previous cases passed upon the legality of the acts in question and pronounced them valid and constitutional. Each constitutional objection raised by the defendant was overruled by the court in its decision.

The complainant sued for an aggregate of penalties amounting to $16,500.00, and the defendant claimed that if the penalties could be aggregated the act is unconstitutional.

The court decided that a penalty for a first violation only could be imposed and with such an interpretation of the law, held the act constitutional.

On account of the defendant company having made arrangements with other companies for physical connection, the complainant claimed that it must also accord the privilege to it. The court observed that telephone and telegraph companies are common carriers of intelligence and must give the same service on the same terms to all who apply for it, without partiality or discrimination, but this does not mean a telephone company is bound to permit another telephone company to make a physical connection with its lines for the purpose of using them as its own subscribers use them. The court showed further that there is a wide difference between a telephone company's transmitting to any point on its line equally and indiscriminately the messages of all companies that offer them and are willing to pay the same fare for the same service, and admitting such outside companies or their patrons to the same use of its lines that its own patrons are entitled to. The Supreme Court of Indiana, however, has taken a somewhat different view of this situation, and holds that if it gives a privilege to one company it must extend the same rights to any other that may apply for it.

The decision of the court therefore is that the defendant companies acted within their rights when they refused to give the privilege of physical connection to the complainant.

Home Telephone Company v. Peoples Telegraph and Telephone Company, *et al.*, 125 *Tenn.* 270; 43 *L. R. A. U. S.* 550.

Cincinnati's Telephone History in Print

A history of the installation of the telephone in Cincinnati, Ohio, and vicinity has been issued by the Cincinnati & Suburban Bell Telephone Company. The story told begins with the year 1878, when there were only eighteen telephones in the city and the cost was a fraction over $2 per year for connection with each other telephone in the city. Today there are approximately 70,000 telephones in Cincinnati and communication can be had from any of them with 7,000,000 subscribers between the Atlantic ocean and the Rocky mountains, Canada and the gulf. From a "toy" the telephone has grown to be one of the most important factors of modern life. The first telephone in Cincinnati was a private line run between the Franklin bank on Third street and the home of Charles Kilgour, Third and Kilgour streets. The first exchange subscriber was the C., H. & D. railroad. The story of development reads like a romance, as time after time equipment costing $250,000, $500,000 or $750,000, and believed to be the last word in telephone apparatus, was thrown into the scrap heap to make way for other equipment twice as costly.

Wisconsin Commission Calls Meeting

The Wisconsin Railroad Commission called every telephone company in the state to a meeting at Madison September 23d. Some 50 telephone men attended, representing the Bell and independent operators of the state, as well as a number of New York and Chicago officials. The object of the meeting was the discussion of standards of telephone service. The commission was represented by David Harlowe, chairman, Chief Engineer C. M. Farson and Chief Inspector John M. Cadby.

The discussion centered about the rules proposed by Mr. Cadby and submitted to the telephone companies last February at the state convention. The conference resulted in the acceptance for further consideration of the following rules:

EQUIPMENT AND CONSTRUCTION OF LINES.

Rule 1. The equipment and lines of all telephone utilities shall be so constructed and maintained as to eliminate, as far as possible, all cross talk and objectionable noise on the line, and to insure good transmission of messages.

Rule 2. On new construction not more than 12 subscribers shall be connected to any one line having a length not exceeding 10 miles. On longer lines this number may be exceeded with the consent of the state railroad commission. Present lines having more than 12 subscribers connected should be reduced to comply with the foregoing as promptly as possible.

Rule. 3. Any telephone company giving service between any two incorporated cities or villages should maintain at least one line between those places to which no subscriber's stations are connected.

Rule 4. Each telephone company shall make such tests and inspections as may be necessary to insure that its lines, stations and other equipment are maintained in condition for rendering adequate service. Local batteries should be inspected and when found to be defective, attention should be called to them or they should be replaced.

Rule 5. An exchange shall be considered as giving reasonably prompt service when 94 per cent of the calls are answered by the operator in 10 seconds or less. Small exchanges, however, will not be expected to handle calls as fast as that. Operators should follow up calls with reasonable care and disconnect promptly after conversation has closed.

EQUIPMENT OF CENTRAL STATION

Rule 6. Each exchange shall have sufficient switchboard capacity and operating force to handle the traffic with reasonable facility. Sufficient traffic studies shall be made by each utility to provide for necessary extensions and to demonstrate to the state railroad commission that sufficient equipment is in service.

Rule 7. Reasonable effort shall be made by each telephone utility to provide for meeting all emergencies such as failure of lighting or power service, sudden increase in traffic, illness of operators and other emergencies which would seriously affect the service were these provisions not made. Small companies should have proper night bells.

Rule 8. Each telephone company serving 250 or more subscribers should adopt suitable rules and instructions covering the phraseology and methods to be employed by operators in handling regular and special calls.

INFORMATION AND TREATMENT OF SUBSCRIBERS

Rule 9. Telephone directories of exchanges of over 1,500 subscribers shall be revised at least semi-annually, and those of all others at least once a year.

Rule 10. Each telephone company should publish in its directory or otherwise such instructions as may be necessary to inform subscribers what action they should take in order to otain efficiency and adequate telephone service from its system.

Rule 11. Each telephone company should provide at pay stations, in its directory, or in another suitable manner, such instructions as may be necessary to inform patrons as to the action they should take in order to obtain efficient and adequate telephone service from its system.

Rule 12. Each exchange shall maintain a record showing all complaints, interruptions or irregularities of the service which shall include the date and time the trouble is reported, the nature of the complaint or irregularity and the duration of the irregularity. All reasonable effort shall be made to eliminate interruptions or irregularities and to promptly take care of all complaints or irregularities which may arise.

Rule 13. In order to facilitate the enforcing of these standards each telephone utility shall file with the state railroad commission and announce to all subscribers, the name and address of the official responsible for the quality of service furnished. Co-operation of subscribers is to be solicited in securing prompt answering, courtesy and adequate service.

About two months hence a final discussion on the subject will be held, and the rules will be adopted as then amended or modified.

The following were among those in attendance and taking part in the discussion: K. W. Waterson and William Christensen, of the American Telephone & Telegraph Company, New York; J. G. Wray and Albert P. Allen, Chicago Telephone Company; W. D. Dakin, Bell Central Group, Chicago; H. A. Seymour and F. H. Lincoln, Wisconsin Telephone Company, Milwaukee; Frank L. Eldridge, Telephone Service Association, Chicago; Senator H. L. Teasdale, Sparta Telephone Company; Senator W. W. Albers and N. Heinemann, Wausau; Walter J. Gallon, manager Citizens' Telephone Exchange, Sheboygan; P. J. Weirich, secretary Wisconsin Telephone Association, Monroe; J. C. Crowley, manager People's Telephone Company, Superior; W. L. Smith, secretary and treasurer Badger State Telephone Company, Neillsville; A. V. de Neven, County Line Telephone Company, Tisch Mills.

Mr. Eldridge received for the Telephone Service Association the compliments of the state commission and the promise of its hearty co-operation, and signed up a number of new members. The Association's book of operating rules received a great deal of attention and a large number were disposed of to the operators.

To Improve Cleveland Service

Elimination of the present four-party line service on the Bell system and in its stead the installation of pay telephones with a measured service is the first step that the Cleveland Telephone Company plans to take in anticipation of the investigation of alleged bad telephone service by the Public Utilities Commission.

B. E. Sunny of Chicago, president of the company, stated that 21,000 telephones out of a total of 56,000 Bell telephones in Cleveland are on four-party lines. A call from one four-party loop to another four-party loop causes a busy signal to be sounded on eight telephones, six of which are not actually in service.

Another explanation of the bad service by Mr. Sunny is that Cleveland has grown so fast that despite attempts of the Cleveland Telephone Company to keep pace, it has fallen behind in equipment. Also, he says, the complaints of business houses often arise from inadequate telephone facilities and not sufficient operating forces to handle the calls.

Mr. Sunny thought the installation of measured service phones would lessen the burden of the wires by eliminating all unnecessary calls.

E. W. Doty, member of the Public Utilities Commission, who, at the request of Mayor Baker, has just made a study of the powers of the commission to regulate the telephone service in Cleveland, reported that the commission's powers are adequate in every particular. He even believes that it has power to regulate wages of operators, in case bad service should be found to lie in the inability of the company to get and retain capable operators at the wages now paid.

"Full power to regulate telephone service, squeeze

water from the stock of merging telephone companies, and fix rates based on physical valuation of telephone property, exclusive of franchise value, is possessed by the utilities commission," declared Commissioner Doty.

"Every complaint relative to telephone service is within the jurisdiction of the utilities commission, not only to investigate but to become the basis of orders for such changes of conditions, improvements of system and betterment of equipment as may be necessary to render good service."

Absolute authority is vested in the commission, according to Mr. Doty, to determine the physical valuation of telephone companies as the basis of fixing rates. In fact, the new law specifically stipulates the form and method of such valuation and authorizes the employment of engineers and experts for this work.

Moreover, before two competing companies can merge, declares Mr. Doty, they must not only receive the consent of the commission, but the commission must approve proposed capitalization of the consolidated concern.

Employees Pay Tribute to Officials

An entirely voluntary and therefore highly appreciated series of memorials have been sent to Vice-President Bayard Kilgour of the Cincinnati and Suburban Bell Telephone Company, Cincinnati, Ohio, by the employees in all departments thanking him and the board of directors, together with the other officials of the company, for surrounding the employees with the best of conditions possible, and for increasing and maintaining good salaries in all departments of the company.

The memorials were unsolicited and unexpected on the part of the employers and show the great appreciation and esteem felt by the employees in the premises. One letter says in part:

We take this method of showing our appreciation and thanking the company for the generous increase allowed us the first of the year. Also for the new benefit system adopted by them. In return we want to pledge ourselves to give the best service we possibly can, and to have you know we can be relied upon at all times.

The memorial was in the form of letters to the officials from each and every one of the departments and signed by the employees. The points mentioned in these letters in addition to the above are: For just and fair treatment, favors shown, increase in wages, the benefit and pension plans, short work day Saturday, kind and courteous treatment and other items of a pleasing nature. To all these Mr. Kilgour, on behalf of the board and officials, sent the following to James Harper, superintendent of the construction department:

The several communications addressed you, and submitted to me, by the employes of the construction department were presented at the meeting today and all the directors present were very much gratified in knowing that the attitude of the employes is so cordial. You can assure all of them for me, personally, that their interest will always be looked after, and that the good feeling between employe and employer will always be mutual.

Competitors Connect in Oklahoma

The Pioneer Telephone Company of Oklahoma City, Okla., has notified the corporation commission that it had complied with the order relative to physical connection between its long distance exchange and the exchange of the Grant County Mutual Telephone Company. The connection was made on August 18. It was expected the order would be appealed to the supreme court of the United States.

Is Telephone Wedding Legal?

Lawyers and laymen are gossiping over the telephone marriage the other day at Dayton, Ohio, of Louis Motzel and Florence Igou, who were made man and wife by a magistrate many miles away in a lumber camp. The couple had hunted in vain for a clergyman, according to report, and were finally advised that a certain "squire" was goodnatured and always willing to oblige. They ran him down finally by telephone, but were informed he would not be in Dayton for a day or two. He cheerfully suggested that they be wed by telephone. Witnesses were "cut in" and the ceremony was performed.

Was it legal? Some lawyers contend it was. Others say "it won't go." A Nevada atorney in discussing the question told of a case at Reno where a would-be divorcee wished very much to take a certain train east. The judge who had presided when the case was heard had decided to give her a divorce, but having to take a hurried trip he had not signed the necessary papers. The divorcee, as many do, wished to remarry before starting to New York. So the judge was called by telephone. He instructed the lady to go ahead and get married, that his decision was valid. And so indeed the lady judged it, for she married within ten minutes. She spent an anxious six weeks afterward, however, for the paper granting the decree, when finally mailed by the judge, went astray and did not reach its proper destination when expected.

Is a sale by telephone legal? Some lawyers say it is if both parties to it are willing to abide by it, but the instant one demurs then the means of making the bargain is very vulnerable. Take the case of stock sales. On the floor of the exchange unlimited buying and selling takes place by just a word, a look or finger. There is no written agreement. And the same thing is done over the telephone. Sometimes transactions covering hundreds of thousands of dollars depend upon the voice at the other end of the wire. But will it stand the test of legality if pushed to the limit? What would be said if the man or woman supposed to have been the man or woman who gave the order for stock buying or selling should deny that he or she spoke?

Rate Raise Asked in Oregon

On the basis of $70,712 physical and other valuation, the Pacific Telegraph & Telephone Company at Oregon City, Ore., in a test case for many western Oregon cities, has asked the Oregon Railroad Commission that the rates be raised evenly to $1.50 for four-party and $1.75 for two-party residence lines, instead of being lowered to $1.25 as required by law. In answer to the allegations of unjust rates by Oregon City councilmen, the company declares this necessary in order to make 8 per cent on the capital invested. The company also asks 8 per cent for depreciation fund.

Judge Denies Invasion of Field

Judge E. E. Sharp in district court of Columbus, Kan., has refused to give the Baxter Springs Telephone Company an injunction restraining the Cherokee County Mutual from installing and operating telephone service in Baxter Springs. He held that the Mutual was already established in Baxter Springs and was merely planning to extend its service there and so was not violating the ruling of the utilities commission that one telephone company can not invade a field where another is giving adequate service.

DEPARTMENT of RAILWAY TELEPHONES

Recent Improvements in the Railophone

By Fred W. Scholz

THE Railophone, first used on the London-Brighton railway line in England, was invented by a German engineer, von Kramer, and is used to transmit signals between a railway station and a moving train. This effect is obtained through the use of alternating currents, which are produced in a circuit lying parallel to the rails, and which currents are duplicated inductively in the train on a frame containing a large coil of wire. At the time when the first trial was made, Kramer used a large coil of wire which he wound around a railway car and which was connected to a microphone, a telephone receiver and a switch on the car. The switch was used either to send the telephone circuits into the large coil, or to receive the electric signals by means of the receiver. Simultaneous speaking and listening was not possible. The permanent current circuit was placed between the rails and consisted of a loop of insulated copper wire which was fastened to the ties by means of insulators. The one side of the loop, the outgoing line was placed between the tracks of the outgoing trains, and the return circuit was placed between the tracks of the incoming trains. The two circuits were crossed several times along the railway line in order to avoid interference with the other telephone and telegraph lines. The end of the loop was also connected to a microphone and a receiving instrument, which could be connected to the loop by means of a switch. The space between the lower part of the large coil, which was wound around the car, and the loop was about 12 inches. This air space was sufficiently small to make telephone conversations audible.

In 1911 Kramer tried out some improvements on the Stratford-on-Avon line, in which conversations could take place between station agent and conductor on the train as is the case with the ordinary telephone. The speed of the train, which was about 50 miles an hour, had no influence on the test. In this latter trial two horizontal frames were fastened to the railway car, the one below the lowest car step, the other below the second step, both at a distance of about 2.3 feet. The upper frame was used to send out telephone currents, the lower one was connected to a receiver. The ground line here consisted of an insulated cable, which was laid parallel to the tracks about 2 feet below the surface. The distance between the cable and the upper car frame was about 7 feet. This arrangement worked well from the start and is still in use.

Kramer now tried to improve his system, so that the trainmen could call up any station from the moving train, and vice versa. The completion of this latter attempt was not reached till the early part of this year. For signal service, he used a very sensitive resonance relay. This relay is used to receive the exceedingly weak receiving signals, and then to use these by means of other relays for currents to operate electric bells, optical signals, or else to operate switches or brakes by means of electromagnets. In this way he hoped to use the railophone system for railway signal service, in which hope he also succeeded. Such a line was built on the above railway line. Its purpose is the following: 1. The train receives an induction current every time it enters a block. This current operates the instruments on the train. The switch tower man or track walker also receives a signal, usually a bell, which rings as long as the train is in the block. 2. While the train is on this line, the signal lever is automatically locked, and is released only when the train has left the block. This prevents another train from entering the block while the track is not clear. 3. The switch tower man can stop the train at any point in the block in case of danger. 4. If the train should enter the block, which is held by another train, it will be stopped automatically by the electric system. 5. If the train runs into an open block, and if the tower man forgets to set the signal in the block to danger, the train sets the signal automatically into that position. The automatic signal system works automatically and does not interfere in any way with the locomotive

Department of Railway Telephones

This department is established as a permanent feature of TELEPHONE ENGINEER. The progress of the art of telephone train dispatching, its technical development, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of TELEPHONE ENGINEER in all parts of the world whose interests lie along these lines.

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engineer or the switch tower man, except when they forget to follow rules, when the signal system begins to work and calls their attention to their errors. This system has been equipped with switches so that the railway people can either telephone or use the system for signals.

A Telephone Game

My little girl, six years old, has invented what to me seems an ideal child's game, says Annie Miller Melick in the *Ladies Home Journal*. She calls it "The Telephone Game," and as it requires nothing but our mouths and brains it can be played when I am ill or busy with my mending and sewing. However, I can see how later a paper and pencil will add to its educational value in making figures, and, in time, in writing. We simply call to each other from room to room or use the same room when it is more convenient.

First I am the lady and she is the store, then she is the lady and I am the store. When I am the lady, and ordering, I ask the price of each article, and correct her when she gives prices ridiculously high or low, telling her what they ought to be. In fact, I ask all sorts of questions as to my purchases, and she is rapidly getting an idea of the current prices of foods and clothing.

When she calls me up I insist upon her speaking just as she would in a real telephone. She must ask first if she has the number she has called for, then give promptly her own name and address. Then she says she would like to have me "charge and send the following order," or send it C. O. D., as the case may be. Then she gives her order.

I ask, for example, how many yards she wants in each tablecloth; if the napkins must match; and how many pieces she wants in the new china set she is ordering; and I explain the differences. Sometimes we have "trouble" on the wire, and purposely I get her into all sorts of imaginary tight places, to see how she can get herself out of them.

We use the different departments of the store until we have furnished the house, and sometimes this runs on for days. Then we supply the kitchen and pantry, while later we buy clothing and occasionally Christmas presents, always being careful to keep our prices in imaginary buying down to what we can really afford, and lower. The times are such that this is not a bad idea in itself.

She is fast learning the intelligent and polite use of the telephone as well as how to take care of herself in an emergency, while, at least, the current prices are beginning to take shape in her mind.

We are sometimes discouraged over our daughters later in life, because of ignorance along these very lines, when it is often we mothers who are really to blame. We must teach them and we must begin early. Children have a great deal more intelligence than we give them credit for, and they might as well be absorbing something worth while along with their childish play.

Orders Five Party Lines Back

Will H. Daly, Oregon commissioner of public utilities, is demanding that the Pacific Telephone & Telegraph Company restore telephone service on five-party lines at the rate of $1.25 monthly for each telephone. Mr. Daly says that under the franchise the company is required to supply service on such lines at this rate, but that the company did away with the five-party line service and increased the rates.

Advance Payments in Michigan

Lawton T. Hemans, member of the Michigan Railroad Commission, supports the contention of the Citizens Telephone Company of Grand Rapids that it has a right to collect three months' rental in advance.

The strongest point made by Mr. Hemans is that relating to comparative losses in Michigan and Wisconsin. In Michigan the Bell Company does not usually charge in advance, in Wisconsin it demands advance payment from every one. In Michigan the loss per telephone from failure to collect is 50.7 cents, while in the Badger state it is only 9.6 cents.

It is plain that this waste in revenue ultimately must come from the pockets of the patrons as must most losses in business. If there were no uncollectible accounts all would get or at least could demand cheaper service, cheaper dry goods, cheaper groceries. The telephone business is no exception to the general rule that the honest customers must pay in the end for the defalcations of the dishonest.

The statistics furnished by Mr. Hemans doubtless will surprise many who have doubted the word of the telephone company when it insisted that it could not afford to run the risks of collection at the end of the month or of the three months' period. It hardly seems possible that there are so many who do not pay their honest debts. The fact that a state official who inspires general confidence, and not the interested corporation, offers the figures goes far to make them convincing.

Incidentally, in this fact that the people are ready to believe an arbiter in the employ of the state is shown the value of having a body that can make a decision in cases of this kind. Those who still doubt may carry the controversy to the full commission if they demand further light on the question.

No More Free Telephones in Detroit

Free telephones amounting to approximately $5,000 to the city of Detroit and the county of Wayne will be cut off at the expiration of existing contracts by the Michigan State Telephone Company. More than 500 city and county employees heretofore possessors of telephone concessions amounting to nearly $15,000 more, have been required to pay the full rate since July 1, or lose their telephones, and a mighty protest is going up as result.

The extent of the telephone concessions to city and county employes was only learned when the company cut loose from the system in response to a ruling of the state railroad commission that rebates are illegal. General Manager von Schlegell, of the telephone company, declared that the total concession to the city was $17,090 and that to the county officers and employees approximately $2,400 more.

Jail for Telephone Swindles

George Lockwood, who created the fictitious Western Telephone & Telegraph Company, for the purpose of backing up his swindling operations, was convicted in the quarter sessions court at Philadelphia, Pa., on five bills of indictment charging false pretenses, and was sentenced to two years in the county prison by Judge McMichael.

Lockwood's scheme was to equip boys with badges of the spurious company and send them to women residing in apartment houses with false checks, collecting charges of $1. He had collected only about $20 when arrested.

Organization for Line Maintenance

By M. C. Allen*

TO secure a practical and economical maintenance of any outside wire plant there must be provided first a detailed and efficient physical supervision and care of the pole lines and wires, and second, similar detailed and efficient electrical supervision and tests of the circuits made up from such wires. It requires that a maximum amount of routine work with proper responsibility and authority shall be given to the unit of the organization made up of the rank and file and controlling the outside plant maintenance. To obtain the best results physical and electrical supervision must be closely allied and its respective work made to be dependent, one on the other.

In this paper I will try to show a physical organization, outlining the various functions involved in the maintenance and care of an outside plant and the responsibilities and dutes of the rank and file, as shown are, I believe, essential for good service and are applicable whether the section linemen, general foreman or line gangs are paid and controlled by either the railroad or telegraph company. The railroad companies and the Western Union Telegraph Company work together in so many different ways that it would be obviously out of the question, in discussing briefly a general scheme of organization caring for routine line maintenance, to attempt to go into all the differentiations of the railroad and telegraph companies' respective share of such work. For that reason the organization, as described in this paper, purposely makes no mention of the railroad superintendent of telegraph and the special maintenance forces reporting directly to him. My idea is to indicate the duties, responsibilities and authorities of employes in the different grades of the organization where one company directs and performs all the work. To you, having a detailed knowledge of the varied contract conditions, it will be readily apparent to what extent the organization of Railroad Superintendents of Telegraph should wholly or in part assume the functions of the various positions described.

The section lineman is the foundation upon which must be built the organization for the physical care of the outside plant and he is the most important cog in that machine. The wire chief and test boardman fills a similar position in the electrical care of the outside plant, and these with the plant chief, to whom they both report, form the first, yet most important unit in the plant organization.

The idea that the wire chief shall test a circuit only when a fault is reported to him and shall tell the lineman, who is always waiting for trouble orders, that some defects exist between two test offices, which are probably fifty miles apart, and that he had better see if he cannot find and repair it, has long since been an abandoned practice. Today the care of a section of outside plant resembles closely that of a power plant in a big factory operated by modern methods, where the engineer and his assistants constantly inspect and know the condition of the many parts which make up their plant, with the result that they remove defects before they affect the efficiency of the plant, and transmit a continuous power service to the machines in the factory which they control.

*Paper read before the Association of Railway Telegraph Superintendents.

By adopting this practice, the lines in any given territory should be divided into sections of such sizes that a section lineman may not only clear all trouble, but do all repair work that can be taken care of by himself and not more than two assistants. The section lineman must have a detailed knowledge of the territory in which his section is located and must keep himself fully informed as to the condition of the pole lines, wires and cables under his care, and in accordance with standard instructions should remove defective parts before they break and cause interruption to the service. He should also inform himself of dangerous trees and structures near the right of way and arrange, through the proper channels, to remove same.

He should cover his section frequently enough to keep himself informed of all work on or off the right of way that will affect adversely the plant in his care and will directly, or through the proper channels, take such measures as are necessary to prevent accidents to the poles and wires. To guard against cases which cannot be met in this way, he should make it his business to become acquainted with property owners along his section, especially in timber lands, and if possible, arrange that such abuttors shall notify him when any work is contemplated that may interfere with the service routed over the wires in his care. When so notified by any property owners, he must, without fail, be on the ground to prevent accident to the wires and endeavor in every proper and reasonable way to maintain friendly relations with them.

He should cover his entire section on light inspection and repair work at least four times a year. Each year, not later than April 10, he should cover his entire section and report in detail to his plant chief, the work necessary to put that section in good condition. This report should show material required, how work is to be done and what assistance is necessary. The work should include replacing defective arms, insulators, pins, crossarms, braces, resetting and straightening poles, trimming trees, cutting down dead and dangerous trees, replacing deteriorated guys and anchors, tightening slack guys and such other work as can be taken care of by himself and not more than two men. Before September and again late in the fall, and once during the winter, he should also cover his entire section and do such work as replacing broken insulators, pin, tie wires and such trimming and other work as is necessary. These three light repair trips should, except in special cases, be made by the section lineman, without other assistance. In addition to this, he should inspect certain parts of his section more frequently when, in the opinion of himself or his plant chief, it is necessary to do so.

By changing the station lineman from a trouble hunter to a section lineman doing maintenance work, and requiring him to be out on his section constantly, the number of line troubles will be greatly reduced and trouble hunting will be secondary rather than his chief duty. Troubles, however, when they do occur, must be removed as quickly as is practicable, and for that reason it is essential that the section lineman at all times keep the wire chief informed of his whereabouts. The proposition of making arrangements whereby the section line-

man of a telegraph company can, when out on his section, communicate with the wire chief, has been given considerable attention. On certain routes available wires have been paired up and transposed, giving, during light business hours, one Morse and one telephone circuit, and this has permitted the use of telephone test sets and has worked very successfully between New York and Philadelphia. The engineering department will give to the field, in the near future, a telephone test set to be used on a single Morse circuit without interfering with the telegraph service, which will have a telephone transmission range of from fifty to seventy-five miles and light enough in weight to be no burden to the section lineman. I consider this one of the biggest helps that can be given to the section lineman scheme of maintenance. It permits the section lineman to call in and keep in touch with the wire chief while doing work on his section. It also permits gang foremen, while on estimate work, to call the wire chief at frequent intervals to make sure that work being done by the gang is not causing interruption to service and permits the gang foreman to take care of troubles in his immediate vicinity. It permits the section lineman, when clearing a trouble, to immediately call the wire chief from the pole on which the trouble is found, obtain tests and clearance, and receive any instructions that may be necessary.

The wire chief or test boardman, as far as the maintenance of lines is concerned, should be responsible for the electrical efficiency of the wires assigned to him by the plant chief. He must familiarize himself with the apparatus furnished for locating faults on wires, and for determining insulation and conductivity values of such wires. In order that he may apply this knowledge to the best advantage, he must prepare data as to the lengths of open wires, cables, location of test poles, test stations, etc., of the section assigned to him. He should also cover the pole lines under his care and inform himself as to the general character of the right-of-way and obtain such information as will assist him in making accurate locations of troubles by electrical tests. He has control of the section lineman when on trouble, and should have knowledge of the latter's whereabouts at all times. He should inform himself, through the proper channels, of line gangs doing work on his section and the nature of the work on which they are engaged.

He must co-operate with the section lineman and by his electrical tests assist in locating and removing sections of low insulations, high resistance joints or sections of bad iron wire and other similar faults which affect the service.

When line gangs doing work on important lines cause trouble which seriously interferes with the service, he should, either directly or through the proper superior, order them to stop work and should immediately make a report to his plant chief giving complete details.

The plant chief, as far as the outside plant is concerned, is responsible for the ordinary or routine maintenance and care of the company's pole lines and wires, etc., for the efficiency of the wire service and the discipline of the forces reporting to him. He should know personally, and supervise closely, each individual reporting to him and his territory should not be so large as to prevent his seeing each employe reporting to him at least once a month. He should also have a detailed knowledge of the routes and character of the various lines in his territory and should more than any other official make frequent inspections of same. He should see that line troubles are promptly removed and should take such steps as are necessary to remove defects before they cause actual interruption to the service. He should supervise closely the work of his wire chiefs and compare in detail their locations of line troubles by test with actual locations as found by the section linemen and should endeavor by proper coaching to reduce these differences to a minimum. He should prepare a monthly statement of line troubles in accordance with instructions and after analyzing same should take up personally with each section lineman concerned, such work as will prevent recurrent troubles. He should examine closely the monthly insulation reports and follow with further tests and inspection sections showing below the standard with the idea of removing the defect. He should also arrange for frequent insulation tests to be made during wet weather, locate and repair the "soft spots" so that good service will not be limited by weather conditions. He should directly, or through his wire chief, make measurements to determine resistance of way circuits made up of iron wires, comparing the theoretical with the actual resistance, and should, by making further detailed tests, locate the high resistance sections and remove them. When high resistances are not confined to joints or short sections, but on account of deterioration of the wire, are distributed over long sections, he should make a report of the conditions to his district plant superintendent, giving full details and with recommendation.

In appointing section linemen, he should, as far as possible, take men from the line gangs, and under no circumstances should he appoint any section lineman without receiving an O. K. from the district or general foreman as to the candidate's practical construction knowledge and ability. The section lineman's position is an important one and the position should be made sufficiently important to attract to it the best men in the line gangs.

By proper development of the section lineman scheme of maintenance, the section lineman's responsibility and remuneration will be such that the best men in the gangs will look upon the sections as desirable positions and will take up gang work with that in view. With the line gang work more or less a floating proposition, foremen and assistant foremen, tiring of working around the country and desiring to settle in one locality, may also take sections without loss in salary and at the same time be reasonably sure of increased remuneration should they do efficient work.

Another way in which good material for the positions of section linemen may be obtained is for the section linemen in country sections to pick up desirable candidates as assistants on their light maintenance trips, and if any show themselves to be adapted to the work, to place them in line gangs with the understanding that as soon as they qualify and are capable of doing efficient pole line work they will be given the first available sections in the vicinity of their homes.

We have heard much in the past, and in the future will hear considerably more, as to the necessity of having section linemen who are proficient in the preparing of complicated reports and statements, and if this ability can be secured without sacrificing the practical line work it is desirable. The principal duty of the lineman should be that of maintaining his section efficiently and economically and to be dependable in cases of emergency. As far as reports are concerned, I think they should be the simplest possible and so arranged that the linemen may fill in figures and a few words in proper spaces. Some of the best section linemen I have ever known could scarcely write their own names, but with wife and family they

were always able to fill any reasonable demands on reports.

The organization as set up, provides that the responsibility, authority and routine work of the outside plant are invested in the unit of the organization containing the rank and file and in the individuals who do the actual work. It further provides that the plant chief shall perform a similar function in connection with the detailed inside plant work, but that does not enter into this discussion.

The plant chief, on account of having control of both detailed outside and inside plant work, should in a majority of cases be a Morse man, but must have or be able to acquire a practical knowledge of the routine outside work, and until that knowledge is acquired should depend on the district or general foreman for information and advice regarding the practical construction questions. No man should be allowed to remain in the position of plant chief who cannot acquire this knowledge.

The organization provides for competition between section linemen on the basis of the per cent of the full revenue earning value of their sections that they are able to deliver to the company. The section linemen should be given proper statements so that they may see in detail just how their sections compare with other sections in the plant chief's territory; how the plant chief's territory compares with others in the district; where the district stands in the division, and where the division stands in the plant. The practice of showing in monthly statements going to the field (including the section lineman), the names of sections in the division having no trouble or a single trouble during the previous month, is valuable. This has developed a healthy competitive spirit and has given excellent results.

This scheme also gives the result of the section lineman's work as it affects the service which together with proper inspections by the plant chief and district or general foreman, forms an excellent basis on which to recommend salary increases for deserving linemen.

It provides that practical inspectors shall follow behind a section lineman on a repair trip and should any poor work be found, it will be taken up with the section lineman not more than three days after the work has been performed by him. Such inspectors must always be better practical construction men than the section lineman involved and a small amount of inspection of this character is beneficial, for the section lineman never knows when he is liable to be checked up on any work by a man better than himself, and this tends to keep him "on his toes" and makes him very thorough and careful in his repair work. Whenever a section lineman complains that reports by a line inspector concerning his work are unjust or not in accordance with facts, I believe it pays for the district plant superintendent and district or general foreman, or the latter alone, to meet the section lineman and line inspector involved on the ground and settle definitely the merits of the question. On the one hand, if the section lineman is inclined to "bluff" the evil is cured by one trip, for such news travels. On the other hand, you tend to keep the line inspector conservative, practical and helpful in his criticisms.

The placing of the section linemen on the same level with the wire chief or test boardman (except when on trouble) permits the plant chief to check the work of one against the other and the proposition of allowing the section lineman to initiate and carry out routine work in his section rather than wait for some one higher in the organization to direct his slightest movements, is a big gain for efficiency and economy.

The unit of the organization directly over and controlling the plant chief is that containing, as far as the outside plant is concerned, the district plant superintendent; district foreman, district wire chief and clerical force; and the district covered by this unit of organization is made up of a number of plant chief's territories. With the plant chief's forces fully organized and efficient, an enormous amount of routine work is taken away from the district plant office; and relieved of such routine, the district plant superintendent is able to give his attention and that of his office force to duties of a higher grade. With these two units of the organization working efficiently, a condition exists which permits increased authority and responsibility to be transmited down the line and provides for the quick application of corrective measures by competent employes, directly in touch with the situation.

The district plant superintendent is able, through proper reports and inspections, to supervise the work of the plant chiefs in his district and compare their work as to efficiency and costs. He is able to determine the best methods for doing work and to provide for similar methods in all plant chiefs' territories. The district plant superintendent is responsible for an economical administration of his district, consistent with efficiency.

With proper restrictions, he should deal direct with state, county and city officials as it affects outside plant work in his district and should in every proper and reasonable way endeavor to establish friendly working relations with them. He should keep himself fully informed as to regulations and restrictions, governing work coming under the jurisdiction of such officials and endeavor at all times to conform with such regulations.

He should have a good working knowledge of the routes and character of the lines in his district and of the conditions affecting their stability. He should arrange that proper reconstruction, and maintenance work be done periodically and that such work will give a common standard of stability throughout the entire length of trunk lines in his district. He should arrange with the division plant superintendent and the district plant superintendent of adjoining districts so that a common standard of stability will be maintained on trunk lines throughout their entire length regardless of districts.

He should, at the beginning of each year after conference with his division plant superintendent, lay out the line work needed in his district and should arrange that proper estimates in accordance with standard practice be submitted promptly to the division plant superintendent and when approved should endeavor in every practicable way to complete the work of such estimates during that year.

The district plant superintendent should be responsible for the prompt restoration of service whenever interrupted by line breaks or other causes and when the damage to lines is of such an extent as to prevent a prompt restoration by his district forces he should at once call on the division plant superintendent for assistance. Each fall he should make requisitions for certain classes of line material so that at the beginning of each winter he shall have at the most advantageous points in his district, such emergency material as will permit him to make prompt temporary repairs in case of failures. He should also arrange that detailed and specific instructions be given to each employe in his district governing their actions and work in any emergency and should, from

time to time, take such steps as are necessary to satisfy himself that such instructions are thoroughly understood by all concerned.

An excellent way of determining uniform methods and providing an efficient scheme of instructing plant chiefs and supervisory forces is for the district plant superintendent to hold monthly conferences, when there should be a free and general discussion by all concerned. At these conferences there should be taken up in detail methods of doing work, proper handling of accounts, correspondence, reports, the making of inspections and the caring for material. Also all new routines should be taken up and discussed in detail so that proper instructions may be given on doubtful points, and thus give everybody concerned a practical understanding of their requirements. It is the practice of some district plant superintendents to call one plant chief each month on the day before the conference and have him bring a week's file and records showing the work of wire chiefs in his territory on the location of line troubles and comparing same with where troubles are actually found. He will also call on the plant chiefs to bring records covering one week showing in detail the nature of troubles, causes of same and how the lineman was handled in clearing same, and in addition to this there is taken up at each conference the analysis of line troubles for the preceding month. Such conferences will promote a free and general discussion and will be beneficial to all.

The district foreman is the district plant superintendent's staff man on all outside plant matters and in addition to that controls and directs, either directly or through general foremen, the work of the line gangs. He is responsible for all construction, reconstruction and maintenance work in connection with pole lines, wires, underground conduits, aerial, underground and submarine cables and pneumatic tubes.

He should have a detailed knowledge of the outside plant in his district and should keep himself fully informed as to the specifications governing the construction and maintenance of the plant assigned to his care. He should be fully informed on the best practical methods of performing line work and should directly, or through proper subordinates, instruct gang foremen concerning such methods.

The district foreman or a competent line inspector should at stated periods, cover sections of pole lines in detail and make pole to pole inspections, where test inspections indicate that pole replacement work is necessary, and shall furnish detailed data covering all work necessary, together with the cost of same, so that proper estimates may be prepared. Inspections for pole replacements should be confined to as few inspectors as practicable and in addition to being fully informed on line construction work they should also be good judges of timber. The line inspector should always be accompanied by the section lineman in whose section he is working in order that he may have the benefit of the lineman's knowledge of local conditions which will help him to determine more closely just what work is required, where chances may be taken with reasonable safety and where certain poles should be replaced even if they exceed specified requirments.

When estimates for line work have been approved, the district or general foremen should prepare detailed instructions governing work to be done at each pole. Where a section of new pole line is to be built or old poles relocated, a competent line inspector should locate and stake out the new pole line and on the stakes should be shown the height of the poles to be set. Such staking out of actual pole and anchor locations, together with the detailed working instructions, will permit of more economical distribution of material and provides for an ultimate uniform type of line in any district. It also permits a gang foreman to remain constantly with his men and direct their work personally, which is his most important duty and that for which he is best fitted. The district foreman, general foreman or competent assistant should visit each gang in his district once a week in order to give proper supervision.

Gang foremen have in the past been compelled to do work with too little knowledge of what was wanted. They have also been compelled to spend too much time away from the job looking up and caring for material, hunting board for the men, preparing routine reports and doing cashier's work, all of which has tended to make the actual pole and wire work expensive and below standard. To correct this evil, the gang foreman should be given a young man of known clerical ability and of a type that can take up and learn line work. This "general workman" as he is called should be first placed in a gang and after acquiring a sufficient knowledge should, under the direction of the foreman, do the clerical and other routine work mentioned. When not engaged in such duties he should be working as a man in the gang. The practice will not only increase the efficiency of the foreman but creates a field from which clerks for the plant superintendent's offices may be drawn.

The district or general foreman is usually a practical construction man and his training is such that writing reports, figuring out costs and putting on paper methods of doing work is a serious task, and one for which he is least adapted. To increase his capacity, I have found it advisable to assist him with a young man who is capable of acquiring a knowledge of outside plant work and whose education is such that he can, under the district foreman's personal instructions, do this class of work. At the same time he will gradually become an efficient outside plant man and thus ultimately make the district foreman a valuable assistant.

The district or general foreman should be responsible for practical work of the section linemen and should make, or cause to be made, by a line inspector reporting to him, such inspections as are necessary to show him that the work carried on by the section lineman is being economically and efficiently performed.

The section lineman scheme of maintenance as outlined is no new discovery, but one which has been used successfully by several wire companies, and found to be the most efficient. In the Western Union service it has been used for twenty years in the Maritime provinces and today the wire service in that section is not excelled by any company at any point. The wires for the most part are used in the land line circuits connecting New York with the ocean cable stations at North Sydney, Cansa and Halifax in Nova Scotia. The section lineman knows fully the value of that service and his own responsibility concerning it and considers himself seriously at fault if his "boss" on inspection finds even a broken insulator in his section. He is an excellent type of lineman, who does all work on his section except when gangs are absolutely necessary. He is reliant and can be depended upon in any emergency and knows his duty so well that in an extended line break he requires no instructions from headquarters. The pole lines in that district are light, yet the conditions under which they are maintained are severe and during the past winter Cape Breton and Eastern Nova Scotia have been cut off three times by heavy

blizzards and high winds. The storm area covered 150 miles and in most cases the interruption to wires occurred after midnight, yet in every instance the section linemen by picking up assistance and before gangs could be moved in have made one wire good by noon and all cable circuits O. K. by night. On one of these occasions there were 300 wire breaks and on another the railroads were blocked for 36 consecutive hours. Some of these section linemen go months at a time without line troubles.

The section lineman scheme of maintenance, as outlined, will increase plant costs as far as the section linemen are concerned, but that increased cost will be more than offset by the increased traffic that may be handled over any group of circuits. Furthermore, with the system fully established, the amount of gang work and the number of line gangs will be considerably reduced and the net result will give in the near future, a greater efficiency at a less cost than is possible today.

Of Interest to the Trade

Thousand Feet Unit of Measurement

In the infancy of the electrical industry many units in general practice were naturally used to signify various quantities and conditions of the new form of energy. Many of the available units were not well suited to electrical measurements because electricity and the various industries to which it has given rise, have developed standards which are entirely different from all precedents. It was therefore necessary to devise new units in order to insure a better understanding of the actual conditions and to provide for greater efficiency in the long run.

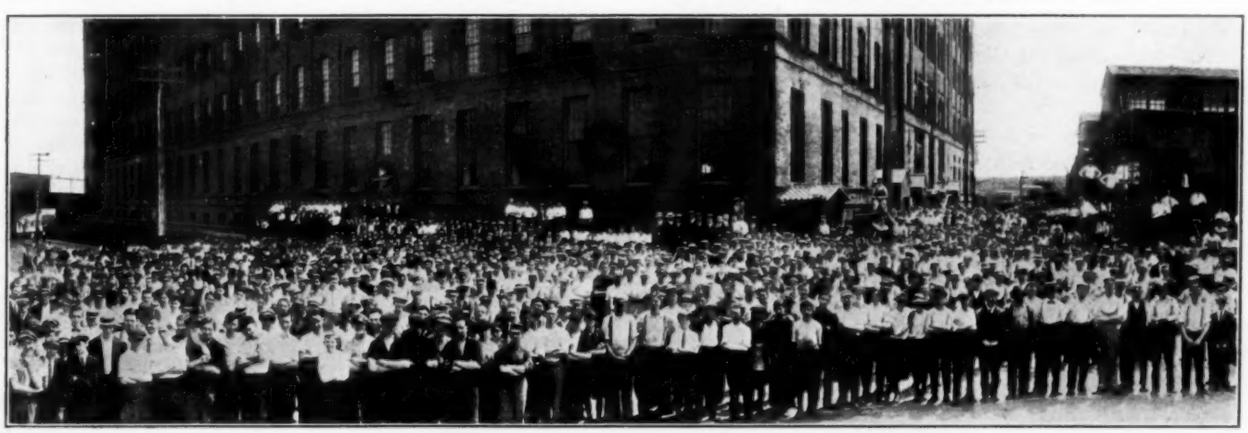
It is undoubtedly because of this early necessity for breaking away from old traditions that the electrical engineering profession has always been among the first to adopt new methods and new units. A pertinent example is the invention and use of the circular mil, which has eliminated η from computations of the cross-sectional area of wires and cables. It now seems probable that the practically universal unit of length, the mile, is to be superseded by a standard of one thousand feet. Tables on costs and prices of wires and cables have been figured on this new basis for some time. Conductor resistance, particularly in the case of copper wire, is now commonly tabulated in ohms per thousand feet instead of in ohms per mile.

It is interesting to note in this connection that the Simplex Wire & Cable Company has recently abandoned the use of one mile as a unit of length for all factory measurements. This applies not only to conductor resistance but to insulation resistance (megohms per 1,000 feet), capacity (microfarads per 1,000 feet), and inductance (henrys per 1,000 feet). By adopting one thousand feet as the unit of length for all electrical measurements at the Simplex factory and thus eliminating (from about a thousand calculations daily) the factor, 5,280, an immense amount of figuring is avoided. In comparing the new standard with the mile, a close approximation for general use—involving an error of less than 6 per cent—is to multiply or divide the mile standards by five. For insulation resistance calculations, at least, a 6 per cent error is well within the limits of manufacture. In fact, as the change does not seriously conflict with former standards and is surely along the lines of simplicity and efficiency, there is apparently nothing but inertia to prevent its general acceptance.

Automatic Traffic Distributor for Defiance, Ohio

A contract for the installation of an automatic traffic distributor system by the Automatic Electric Company of Chicago, was recently let by the Northwestern Telephone Company of Defiance, Ohio. After the consolidation of the Central Union Company's system at Defiance with its own, the Northwestern Company began the construction of a commodious fireproof building of brick and concrete which will be completed in about 60 days. Two months later the installation of the automatic traffic distributor will be finished. The apparatus will be of the most modern type, being equipped with automatic ringing, automatic peg count, automatic busy-back and automatic disconnect from the operator, thus cutting her off the line as soon as the connection is completed.

The automatic traffic distributor consists essentially of the Keith line switch, to which all subscribers' lines are connected and from which trunks in the proportion of 1 to 10 run to operators' positions, terminating in single-end cords. When a subscriber removes the receiver from the hook at his station, his line is instantly connected over an idle trunk to a non-busy operator and at the same time



"Noon Hour at the Factory" of the Electric Storage Battery Company at Philadelphia. From a Large Print Suitable for Framing, Sent Out by the Company.

the Keith switch is set so that the next call coming in will have access to another idle trunk.

By this means the calls are evenly distributed among the various operators, none receiving more than she can handle, but all kept working at full capacity. When the load decreases, it is possible to reduce the number of operators to meet the requirements of the traffic.

The automatic traffic distributor system, it is said, will prove popular with the operators, as the work of setting up each call will be materially decreased, a single-end cord being substituted for the usual double-end one in use on ordinary manual boards. It is therefore unnecessary for her to plug into the answering jack, but instead when the signal lamp connected with any trunk lights, she relieves the call directly through her headset, plugs into the multiple, the automatic ringing, busy-back and disconnect features releasing her from all further supervision over the call until the calling party hangs up, when the lamp again lights and she removes the cord from the multiple. Furthermore, calls will come to her in an even, steady flow, which permits her to work at her best efficiency but never crowding her with rushes, as is the case with the ordinary manual board.

The economy of operation and efficiency of service promised with the automatic traffic distributor makes the apparatus very attractive to the operating company. The operating force being reduced from 30 to 40 per cent depending on local conditions, a corresponding saving is made in operating expenses while improving the service rendered subscribers, by making it more uniform and rapid, and absolutely secret, as it is impossible for the operator to "listen in" after setting up a connection.

By means of the automatic peg-count the chief operator is enabled to keep an exact record of the amount of work performed by each operator, and some of the companies at present contemplating the installation of the automatic traffic distributor system in their exchanges are considering a plan by which the operators will be paid according to the number of calls they handle.

Another important feature of the automatic traffic distributor system is that should the Northwestern Telephone Company decide to eliminate the switchboard operator entirely and install full automatic equipment, the Traffic Distributor apparatus can be utilized to full advantage, thereby saving approximately 40 per cent of the cost of converting the exchange from ordinary manual to full automatic.

Ohio Automatic Association Meets

The Ohio Automatic Telephone Association, comprising independent telephone companies in ten cities, nine of them in Ohio, with Richmond, Ind., outside the state, held a meeting at Bucyrus, Ohio, with representatives from every company in the association present. The association, which was formed for the primary purpose of exchange of ideas and the improvement of the telephone service of the exchanges represented, was organized a little over a year ago at Columbus. It has meetings every six weeks at the various exchanges in turn, at each meeting a committee making an inspection of the plant in that city and reporting what it finds to the assembled delegates. Problems disclosed are then discussed and puzzles solved if possible. The results have been uniformly encouraging.

Delegates present at the afternoon meeting were: R. K. Judy of St. Marys; C. A. Swayer, T. B. Moody and C. H. Babbert of Columbus; H. Doveen, W. H. Miller, H. O. Dutter, J. B. Sharrock and Benjamin Shearer of Bucyrus; F. J. Trupp, Van Wert; R. A. Folsom, Dayton; B. C. Groh and N. P. Bartley, Chicago; E. N. Follett, Newark; Seymour Hirsch, Toledo; J. C. Merrill, Dayton; C. E. Hollander, Newark, and W. C. Bollinger, Akron. The committee which made the local inspection was composed of R. K. Judy of St. Marys; R. B. Folsom of Dayton and E. F. Follett of Newark.

After the business meetings the delegates had dinner at the Elberson hotel and enjoyed a quiet social session there. The next meeting will be held at Akron, October 13.

Officers of the association are G. R. Johnston of Columbus, president H. O. Dutter, Bucyrus, vice-president; Charles Holland of Newark, secretary, and Leroy Parker of Columbus, treasurer.

Independents Urge Telephone Suit

Independent telephone interests are urging Attorney General McReynolds to sue the American Telephone & Telegraph Company under the Sherman anti-trust law. This question is looming up as one of the most important before the department of justice, just as it was in the last administration. After long consideration and numerous conferences with officials of the American Telephone & Telegraph Company the then attorney general, Mr. Wickersham, referred the whole question to the interstate commerce commission for determination of facts on which the government might formulate a policy with regard to communication utilities.

The interstate commerce commission is proceeding with the inquiry, but will not be done for many months. The independent telephone companies, with which the Bell system, controlled by the American Telephone & Telegraph Company refuses to connect, complain that they will be wiped out of existence by the aggressive competitive methods of the great combination.

The government already is suing the subsidiaries of the American Telephone & Telegraph Company in Washington state. The city council of Chicago has requested the attorney general's opinion on the legality under the anti-trust law of the American Telephone & Telegraph Company's proposed purchase of the Chicago Tunnel Company, representing 300,000 independent telephone subscribers.

Western Maryland Railroad Telephones

Because of the excellent results obtained by the use of telephones for dispatching trains between Hagerstown and Cumberland the Western Maryland has decided to extend the system to all lines west and south of Cumberland. The contract for the extension of this system has already been awarded and work is about to begin. The telephones, when finally installed, will be in operation on about 326 miles of additional track on the Western Maryland. This additional mileage will include the new Connelsville extension, the line between Cumberland and Elkins and all branches. The only portion of the Western Maryland system which has not been equipped with telephones is that located east of Hagerstown. The use of telephones in connection with train operations will be extended to this particular part of the line in the near future.

A handsome catalogue of Peerless electrical measuring instruments has been published by the Thompson-Levering Company, Philadelphia, and should be in the files of every operator.

Joint Pole Ruling in Portland

Public service corporations supplying service by using poles in the streets of Portland Ore., are to be required to make use of one set of poles with common user privileges. An ordinance requiring all companies to conform with this order is being prepared.

Will H. Daly, commissioner of public utilities, who is having the proposed measure drafted, says that it is absolutely imperative that immediate action be taken, as some streets on the east side are beginning to look like wind-swept forests. On the corner of Cook and Mississippi avenues, according to Commissioner Daly, there are 14 poles grouped within 100 feet, making traffic from the street to the sidewalk nearly impossible.

The matter was taken up with the telephone, telegraph and light companies owning poles some time ago to have them conform with common user privileges. An immediate response was not forthcoming, so the companies are to be required to conform with the new order by ordinance. Police power is to be used if necessary to enforce the ordinance.

Higher Rates Asked at Joplin

Application was filed by the Home Telephone Company of Joplin with the Missouri public service commission for permission to increase its rates for local service.

The company sets out in its application that it has 3,400 instruments in operation in the city of Joplin, but that it cannot earn a compensatory interest on the amount of money invested in the plant under the present schedule of rates.

The company says it should be allowed to increase rates for both business and residence telephones, which should be fixed at a figure that would enable it to earn 10 per cent on the capital invested.

The increase asked is $4 per month for business telephones on special lines instead of $2.50 per month, the present rate, and $2.50 per month for residence telephones, instead of $2.

Operating Company's Big Garage

Improvements costing $20,000 will be made by the New York Telephone Company on its "James" exchange building at South State and East Washington streets, Syracuse, N. Y.

Ground will be broken for the erection of a garage 50 by 80 feet in dimensions, in which to house the company's automobile outfit of twenty-five motor driven vehicles, including fifteen trucks, a number of runabouts and the repair and emergency wagons.

The building, which will be one story in height, is to be of fireproof construction, with brick for the exterior walls. The plans and specifications were prepared by the engineering department in the New York office of the company. Complete, the structure is estimated to cost $10,000. It will be ready for occupancy December 1.

Boise Wants Automati

Complete maps of Boise, Idaho, have been forwarded to the Automatic Electric Company of Chicago by a committee making investigations to induce the company to enter the field. It is claimed that a large number of people have signed to take the telephones if the system is installed and the list of subscribers was forwarded to Chicago with the maps.

Rate Investigation In Montana

Montana telephone rates are to be probed by the Montana public service commission, at least in one particular instance. Through Secretary R. F. McLaren it today sent formal notice to the Mountain States Telephone & Telegraph Company that it has determined to investigate, upon its initial motion, the rates charged for telephone service in Forsyth.

The allegation is made by the commission that the rates are discriminatory in that Forsyth is classified in the defendant's schedule in Class B which includes cities and towns having a population of from ten to fifty thousand. The commission points out in its notification to the company that the official census shows Forsyth to have a population of 1,395 and that therefore it should apparently be included in schedule Class D.

Operators Save A Town

The heroism of two telephone operators saved Creston, Ohio, from complete destruction by fire September 11 when flames consumed six store buildings, representing a quarter of the business section of the town. The cause of the blaze is not known. The loss will reach $50,000.

It was at 4:30 o'clock that Mary Gilmore, night operator at the Farmer's Telephone Exchange, who slept in the building, awoke to find the room full of fire. Dashing through the blaze in her night clothes she ran into the street, crying "fire"!

Mrs. Ward Carter, who is night operator at the Star telephone exchange nearby heard the cry. She at once called the firemen at their homes by telephone, and then called the nearby town of Seville and aroused the department there.

Municipal Plant for Minnesota Town

Thief River Falls, Minn., will have a municipally-owned telephone system. This was decided at a recent council meeting, when a resolution was adopted providing for an issue of $30,000 in bonds at 6 per cent. The clerk was instructed to advertise for bids, and the deal will be made as soon as the bonds are sold.

The local exchange is owned by the Tri-State Telephone Company, and the city officials have been negotiating for the plant.

The clerk was also instructed to advertise for bids for laying water mains a distance of 25 blocks. Sewage mains are now being installed.

"Wireless" on Pennsylvania

The Pennsylvania has been conducting experiments with a "wireless" telephone system to be used on trains. The first tests have already been made on the Huntingdon & Broadtop line and the freight and coal cars of this system are being equipped with the new wireless system.

It is said the new device will be a great aid in the prevention of accidents. The communication is between engineer and conductor. Although the apparatus is practically wireless, a metallic circuit is used, the track and car couplers making the circuit.

"Directions for Operating Leeds and Northrup Portable Testing Sets and Cable Testing Apparatus," is a red-covered book of 120 pages, and constitutes a treatise in simple language on making every sort of electrical measurement.

Nora Bayes Sings into Telephone

"I experienced one of the greatest nervous strains of my career while in Chicago a few weeks ago," said Miss Nora Bayes at the Hotel Kernan in Baltimore, Md., during a recent appearance in "The Sun Dodgers" at the Auditorium Theater.

"I sang several of my songs into a telephone for the delectation of the patrons of the new automatic telephone company which is being promoted in the Windy City.

"This company has recently installed a special service which places in the home of each patron a sort of megaphone attachment through which the greatly amplified voices of well-known theatrical artists are brought into more than 20,000 homes once a week. The singers render their songs into a special phone at the central office at a given time.

"All artists," said Miss Bayes in discussing her experience with this new device, "admit that making phonograph records is a nerve-racking experience, but I was more utterly fatigued after singing four songs into that telephone than if I had been making phonograph records all day. My fatigue was purely psychological. I am certain of that. I knew that thousands of persons were listening to me sing, yet I could not hear the slightest sound of encouragement from any of them. It was most exasperating. In making records you know that no one is listening. Singing to just a metal cylinder is trying enough, but singing to an audience and getting no reflex result is positively horrible."

Wireless Telephony Given Foreign Tests

The Paris daily papers state that wireless telephone messages were lately sent over a distance of more than 600 miles from Rome to Tripoli. Wireless telephony does not appear to have made any marked progress until the present time, since the well-known work of Poulson and Prof. Majorana's experiments in Italy. This latter inventor used a sensitive microphone of his own design and in this way the torpedo destroyer "Lanciera" covered 250 miles in the region of Sicily. However, the recent results obtained by Prof. Vanni of the Military Wireless Institution, near Rome, are quite remarkable, as he is able to connect with a post in Tripoli, or about 600 miles from Rome. In these experiments he makes use of a liquid microphone based upon the ideas of Chichester Bell, brother of the celebrated Graham Bell. Using a microphone of this kind together with apparatus of the Moretti type the voice could be very well heard at Tripoli, and the persons there were able to recognize the professor's voice. A still more striking effect was had by using a phonograph to deliver the voice into the telephone transmitter, and even here the words were distinguished very clearly in the African post. After improving his apparatus, Prof. Vanni hopes to telephone between Rome and Paris. Although the distance is not over 730 miles, the natural obstacles, such as mountains and forests, will make the work more difficult than in the case of the over-sea transmission.

Consul Edward J. Norton states that the Bombay (India) Telephone Company now operates 4,170 telephones and 250 private line installations from central exchange, the equipment being from Sweden. The public reference library of the Bureau of Foreign and Domestic Commerce at Washington contains a copy of the new Bombay telephone directory.

Growth of British Telephone System

British government statistics of the telephone trunk system in the United Kingdom show that within 10 years the number of the trunk telephone lines in use in this country has nearly trebled.

In 1903-4 there were 1,363 trunk lines with a total mileage—double wire—of 49,000 in use, the average number of 34.1 calls per trunk circuit per day yielding receipts of $1,584,167. Steady increases were shown each year until in the last year, 1912-13, the postoffice controlled 3,180 trunk lines of 117,900 miles, and the receipts were $4,439,912. The calls averaged 38.8 per trunk circuit per day. In the previous year a slightly higher average was registered, the number being 39.6 per day. The average cost of operating each call in 1912-13 was 2.52 cents, whereas in 1907-8 it was 2.54 cents. In 1907-8, the earliest year for which particulars can be given, the cost was 2.54 cents, and during the intervening years it ranged from 2.46 to 2.74 cents.

Features of Telephone Service in Paris

Three new exchanges are now being provided in Paris in addition to the 11 exchanges formerly providing service for the 100,000 telephone stations of the urban service. The average calls per subscriber per day are 13. The annual growth of the service has increased over that of 1910 by 77 per cent, there being 5,648 additional subscribers during 1912 as compared with the 3,378 of the former year. The largest composite cables used are of 448-pair capacity. With regard to the interurban service, 530 circuits, including 20 international, are brought into the Rue des Archives exchange, the distant circuits running on railway pole lines up to within 12½ miles of the city, after which they are carried underground.

The Saskatchewan government telephone system in the Canadian Province of that name expended $1,526,755.95 during the year ending February 28, 1913. The gross income amounted to $392,393.17. During the year construction has been done as follows: New toll offices, 46; new exchanges, 34; pole miles, long distance, 516.22; wire miles, long distance, 3,766.8 and service was extended to 4,288 new subscribers during the year, making a total of 9,850 subscribers now being served. The telephone situation in this great grain growing province at the present date shows 251 rural telephone companies, 22 independent companies, 5 municipal telephone systems in addition to the government system.

Telephone Company to Give Weather Report

The Groton-Ferney Telephone Company, Columbia, S. D., has made necessary arrangements to have the weather report given on all rural lines. The report will be received at central about 10:30 a. m., and will then be given as soon after that as possible. The signal for the report will be one extra long ring and everybody is privileged to listen.

Supplementing a previous report, an American consul has transmitted specifications, with invitation for bids, for the installation of a new telephone exchange in his district. Copy of the complete report, setting forth the conditions of the contract, blue prints, etc., can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C.

A Microphone Detective

In France there is employed an application of the microphone to detect fire damp in mines. This is its principle: If sound waves from two pipes of equal pitch impinge on microphones connected in series with a telephone, a clear note is heard; but if one of the pipes emits a slightly different note, beats will be heard in the telephone. Here is the application: One pipe is placed in the mine, the other above ground, and they are blown simultaneously. If the air in the mine is charged with fire damp, it will produce a different note from that produced by good air.

A record in telephony is claimed to have been accomplished by the Telefunken Company, of Berlin, in connection with the experimental station at Nauen by the use of the company's high-frequency machine for the production of sparkless oscillations, in conjunction with a new method of switch arrangement. Having previously notified various receiving stations of the intention, extracts from newspaper articles were recently read aloud at the Nauen station, and are said to have been transmitted distances of from 370 to 430 miles, as, for instance, to the Vienna Technological Museum, where they were perfectly understood by Prof. Kann.

New York City and Denver have been connected for long-distance telephone communication for some time. Plans have now been completed for the stringing of four heavy copper wires from Denver to San Francisco, which with the phantom circuit established on them will give three complete telephone circuits and actual transcontinental connection.

The post and telegraph department, Rome, Italy, invites tenders for the construction of telephone lines, either by overhead wires or by underground cable between Turin, Genoa, Milan, Bologna, Florence, Rome, and Naples, with branches from Bologna, to Venice, and from Florence to Leghorn; also for constructing interurban and international telephone lines at an estimated cost of $10,608,970. Tenders will be received through local agents only.

The cost of treating poles varies according to the wood treated, the kind of preservative and quantity used, and the process employed, but it is only in rare instances that the adoption of a pole-treating policy is not economical. The United States Forest Service has a large number of poles treated by different methods under record and subject to annual inspection in order to determine the relative values of the different methods and preservatives.

Farms Have 2,481,000 Telephones

"There are 5,012,000 farms in the United States, 2,481,000 of which are equipped with telephones." This was the statement of C. S. Voorheis of New York in a talk to the Western Electric Conference Telephone Specialists, held in Chicago at the Hotel La Salle. "In the last sixteen years," said Mr. Voorheis, "the farmer has steadily increased his wealth production. During this time the farmers' wealth production has increased 141 per cent."

Pulmotor Installed by Telephone Company

The Pacific States Telephone & Telegraph Company at Portland, Ore., has installed a pulmotor—a machine for the restoring of life to the electrocuted or electrically shocked—and is arranging to permit the public free use of it. A call upon the company by telephone that the machine is needed will bring it.

Brevities of the Business

PERSONAL NOTES.

Claude Lee, manager of the Central Union Telephone Company at Muncie, Ind., was appointed receiver for the Perkinsville Mercantile Company. The firm did a general merchandise business at Perkinsville, an inland town.

J. J. Jones, who has been manager of the Bell telephone exchange at Mount Hope, Illinois, for several years, has been transferred to Sedgwick, where he will have charge of both Sedgwick and Valley Center exchanges.

H. G. Conger, formerly manager of the Central Iowa Telephone Company of Manchester until he went with the Iowa Telephone Company, has just been appointed commercial manager of the latter company for Iowa. Mr. Conger, on leaving Manchester, went to Des Moines, where he has held a responsible position with the Iowa company. His old home is at Manchester, where he first entered the telephone business.

W. W. Tracy has purchased of Mrs. Raffensberger the entire telephone exchange in Hunnewell, Mo. The exchange includes about 125 miles of property outside the city of Hunnewell as well as all residence telephones, franchise, etc., in the city. Mr. Tracy will turn over the management of the system to his son, Clarence E. Tracy.

C. L. Miller, former manager of the Kenosha Home Telephone Company, who has been manager of the Janesville division of the Wisconsin Telephone Company for the past year, including the counties of Rock, Green, LaFayette and part of Grant and Iowa counties and previous to that since March, 1911, had been in charge of the local office in Janesville, leaves on October 1 to take charge of the Madison division of the company, with headquarters at Madison. Mr. Miller's new position is in charge of one of the most important divisions of the Wisconsin Telephone Company outside of Milwaukee, if not even more important than the Milwaukee exchange itself. There are fourteen of the largest exchanges in the middle portion of the state in the district, including the Madison office, which is one of the busiest outside of the Milwaukee central exchange.

Frank Elgan, for the past four years manager of the telephone exchange in Council Bluffs, Ia., has just been promoted to be district commercial manager of the Council Bluffs district of the Iowa Telephone Company. He will remain as district manager of the Independent Telephone Company of Council Bluffs, and will maintain his headquarters in that city.

Walter Pankey, recently from Wyoming, is now in charge of the Tempe division of the Mountain States Telephone Company. Harry Kleinz, formerly in charge, has been transferred to Phoenix.

George E. Bickley, who has been superintendent of plants for the Corn Belt Telephone Company at Waterloo, Ia., will be promoted September 1 to the general management of the Corn Belt. He will succeed the vice-president, who has been acting as general manager for the last eighteen months. In his new capacity he will have charge of the Corn Belt from Parkersburg on the west to Independence on the east, from Nashua on the north to Vinton on the south. Several other changes are effective the same date, among them the appointment of C. E. Pickett as general counsel, vice C. W. Mullan, resigned. W. P. Walker is appointed superintendent of the traffic and commercial departments, reporting to Mr. Bickley. W. A. Pixley is named general auditor and George W. Fawkes auditor of the company.

George L. Pavy, who has been manager for the Mountain States Telephone Company in Missoula, Mont., ever since the company was organized and who was manager of the old Rocky

Mountain Bell Company for years before that, leaves for Anaconda to take charge of the company's business there. He will be succeeded in Missoula by O. Bigelow, who comes here from Anaconda.

C. A. Bloss, district manager of the Union Telephone Company at Owosso, Mich., has resigned and G. L. Pattee, former manager of the Mt. Pleasant exchange, takes the office.

After a faithful performance of his duties for fourteen months, B. L. Edwards has retired as manager of Nebraska Telephone Company of Central City, Neb., in favor of A. D. Connor of Lexington. Although public announcement had not been made of the fact, Mr. Edwards had for some time been seriously considering a business proposition in the east with view to bettering his present circumstances.

D. Alexander, who served the Orange Home Telephone exchange of Orange, Tex., for the past few weeks as wire chief, has resigned his position and left for San Antonio, where he will go to work in a similar capacity for the Independent Telephone Company.

A. Brook of Chicago has succeeded R. W. White as manager of the Southwestern Telegraph & Telephone Company at Victoria, Texas. Mr. White has been appointed district commercial manager for the new district.

Ralph S. Nelson, for two years in the employ of the Mesaba Telephone Company at Hibbing, Minn., has been transferred to the Grand Rapids office as manager. He succeeds Maures C. Wilcox.

O. C. Dennis of the Premier Electric Company announces that he is making "Hi-Lo" horn for Ford automobiles. Any Ford owner among the telephone trade can get this excellent device, which operates from the Ford magneto and needs no additional batteries.

Lathrop Collins has been appointed western manager of the International Motor Company, vice Fred Robie, resigned. Mr. Collins brings a fund of technical knowledge with him collected at the Cadillac factory at Detroit, where he was mechanical supervisor and efficiency expert and the King Motor Car Company, where he was superintendent.

The board of directors of the Petroleum Telephone Company decided to further extend its extensive conduit system in Oil City. The underground conduit to be constructed by the company to date is as follows: The Sycamore street conduit will be extended to Spring street east and on Elm street north and south to Center street and the Erie railroad. The new conduit will be what is known in that line of construction as 12-"way" or "duct," the diameter of the conduit to be 9x13 inches. There will be six large manholes. Eventually all of the wires of the Petroleum Telephone Company will be under ground in Oil City.

Professor Edward W. Bemis, Chicago's telephone expert, has been appointed a member of a special committee of five to act in an advisory capacity to the Interstate Commerce Commission in making the physical valuation of the railroads of the United States authorized by congress. The purpose of this committee is to take the recommendations of the board of engineers appointed to assist in the work and reconcile them with the less technical views of the members of the commission.

Theodore N. Vail, president of the American Telegraph and Telephone Company, was elected a member of the exchange committee of the New York, New Haven & Hartford Railroad at a meeting of the committee at New York. The committee was in session at the Grand Central terminal.

Besides ratifying the appointment of O. O. Welsheimer, recently of Canton, as general manager to succeed E. L. Kline, the directors of the Toledo Home Telephone Company created the office of consulting engineer, and appointed as the first incumbent of the office B. H. Brooks of Columbus. Mr. Brooks is consulting engineer for many big corporations. He will come to Toledo on call, retaining his residence in Columbus.

NEWS FROM THE FIELD.

ALABAMA.

A permit was issued to the Southern Bell Telephone Company for the construction of a $15,000 telephone exchange on Fifty-fifth street, between Second and Third avenues, Woodlawn. The building will be a two-story, fireproof concrete structure of unusually attractive design. The foundation work is already under way and the rest of the building will be rushed to an early completion.

Guinea Mutual Telephone Company, Birmingham, capital $1,000; to operate telephone line, etc.; incorporators, O. O. Robinson, Howard Hillyer, Elva Higgins.

ARIZONA.

The proposal to pave the streets of Tucson in the business district will be given renewed attention at an early date. The council will first pass an ordinance requiring the placing of telephone and telegraph wires underground in certain sections of the city.

ARKANSAS.

The Arkansas & Missouri Telephone Company, an Arkansas corporation with headquarters at Cotter, which owns most of the telephone lines in this section of the country, has a new metallic line under construction from Cotter to Mountain Home.

Berryville Telephone Company, Berryville, was incorporated with capital stock of $10,000 to establish telephone system.

The telephone line from Batesville to Jamestown was sold by the Southwestern Telephone Company to Compton & Pate of Jamestown, and Herman & Bell of Desha, who will organize a stock company to take over the line and extend it. It is the purpose of the company to reduce the toll rates and to acquire possession by purchase of all the rural telephone lines in this section.

Approximately $125,000 is the estimated loss of the Southwestern Telegraph & Telephone Company in the Hot Springs fire, according to Curtis Stout, district commercial manager. It is said that with the exception of a short time the company maintained good service in the stricken city and was able to give excellent service on long-distance wires.

CALIFORNIA.

A six-story fireproof building will be erected by the Pacific Telephone & Telegraph Company on the site of its present building at No. 622 South Hill street, Los Angeles. Plans are now being drawn and the company expects to start construction very soon. The new building will have a frontage of about seventy-five feet on Hill street and will extend back to the building now occupied by the main local exchange. Although it is proposed to build only six stories at present the building will be designed for twelve and the additional six stories may be constructed soon.

Material has been ordered by the Pacific Telephone & Telegraph Company for the construction of three additional trunk lines from San Diego to the La Mesa exchange. Work will be commenced on the improvement as soon as the material arrives, and the company expects to have it completed by October 15. The new lines are being installed at the request of citizens of La Mesa. They complained that the present service is congested and their appeal or improved service was quickly granted. There now are six trunk lines running to La Mesa, and the proposed improvement will make an increase of 50 per cent in efficiency of service. Three additional trunk lines will more than care for the present needs, but the company decided to put them in now to keep ahead of present requirements. They will serve La Mesa, Spring Valley, Lemon Grove and towns in the immediate vicinity.

Work has started on the installation of a complete new equipment of the Pacific State Telephone Company in their new building at North Main and Cleveland streets, Los Angeles. Officials of the company say that when the work is done there will be no superior exchange in California. The latest type of switchboard is being installed with 1,000 stations and it embodies all the latest devices for rapid service. Comfort of employees has been safeguarded in heating, ventilating and lighting system and in provision of rest rooms. Including the building the investment for the local plant will be approximately $70,000.

The handsome new sub-station for the Home Telephone Company on Rollins street, near Fremont avenue, South Pasadena, is completed. The style of architecture follows the general lines of the new clubhouse in the course of erection across the street for the Women's Improvement Association. The building is of ruffled brick, a story and one-half in height, with concrete foundation. It has a shingle roof with an interior of attractive finish. Every convenience has been provided for the comfort and well-being of the employees.

Preliminary plans are being formulated by the Pacific States Telephone & Telegraph Company, through the Oroville office, for the establishment of a telephone line from that city to Tilden, Berry Creek and Big Bar, populous mountain sections that are at present without telephonic communication. Construction on the line will be started October 1.

Orders to have all poles on Citrus avenue and Orange streets, Redlands, in a portion of the ornamental lightning zone removed by September 1, and mains placed underground has re-

sulted in a controversy between the city trustees and officials of the Home Telephone Company.

COLORADO.

A modern fireproof telephone exchange building with steel doors, a dining room and rest room for the telephone girls, shower baths and lockers and a recreation ground outside the building on Kiowa street in Colorado Springs, will be made from the present Mountain States Telephone Company's building on East Kiowa street, according to District Manager P. A. Holland, who received a copy of the revised plans for the remodeling. Work will be rushed through to immediate completion. The building will be in the shape of an L and will extend 25 feet forther north than the present structure. At the north end an extension will be made, and in the basement will be the terminal room, store room and the district wire chief's office. The business offices, district manager's office, locker rooms and baths will be on the first floor. The feature of the new building will be the accommodations for the operators.

I. K. Browning, who was manager of the American Telephone & Telegraph Company long distance wires in the Arkansas valley at Lamar, has been promoted to a position in the office in Denver.

GEORGIA.

The Citizens' Telephone Company of Hampton was commissioned with a capital of $10,000, the petitioners being W. A. McDaniel, George Warren and J. W. Vincent.

ILLINOIS.

Carl V. Wisner filed application in the circuit court at Chicago asking that a receiver be appointed for the Globe Automatic Telephone Company of Chicago. He alleges that the company owes him $607.

Warren County Telephone Company, Monmouth; capital, $40,000; incorporators: Harry E. Shugart, Harry E. Jewell, Eliphalet Crane.

The Merchants & Farmers Telephone Company of Hillsboro is having a new switchboard installed. When the work is completed the subscribers will be insured much better service. Carl Bowling, who is located at Hoopeston, Ill., is assisting with the installation.

A special meeting of the city council of Bushnell was called for the purpose of considering the telephone situation in Bushnell. The business of the evening was the consideration of an ordinance granting a twenty-five year franchise to Edward S. Slusher and Charles K. Todd to erect and conduct a telephone system in the city. The ordinance was adopted unanimously. There was little debate, although the maximum prices permitted to be charged for service caused some discussion.

The shareholders of the Mutual Telephone Company of Princeton held their annual meeting and put in Ralph Allen as manager and Mr. Whetstone of Thomas, as telephone operator.

The DeKalb County Telephone Company has bonded itself for $100,000, the Pierce Trust & Savings Bank of Sycamore being the trustees. Of this amount, $60,000 is to be issued at once to take care of the indebtedness of the company, and the $40,000 remains in the hands of the trustees to be used only for extension. These bonds are for sale at par to the general public.

Rock River Telephone patrons are assured better service by the improvements under way. The company is installing a new switchboard, with all the late improvements and a capacity of 2,500 telephones, in the second floor of the Hilb building at Rodell on Cherry street, formerly occupied by A. A. Phelps. This doubles the present quarters. The switchboard is now in the building and is being set up.

A general reduction of 40 per cent in the assessment on the Inter-State Telephone & Telegraph Company in most townships of Will county was made by the board of review. Adam Clow of Wheatland appeared before the board and made a convincing statement for the telephone company. There was no objection to the Joliet assessment and a few other towns.

Directors of the Inter-State Independent Telephone & Telegraph Company discussed several plans of reorganization at their meeting yesterday afternoon at the company's offices. Before adjournment the directors elected the following officers: President, E. J. Marshall, Toledo; vice-presidents, George W. Walbridge, Toledo, and E. L. Barber, Aurora; secretary and treasurer, E. H. Cady, Toledo.

A new toll board will shortly be installed at the local exchange of the Central Union Telephone Company at Rock Island. The board has six toll positions and will increase the local equipment to ten positions for toll calls. At present there are but four in use. Other additions to the equipment at the exchange are just being completed.

The Inter-State Telephone Company has a large camp of men at Frankfort, engaged in building a new toll line to Kankakee. The line from Joliet has also been greatly improved by having four new copper wires strung from there to Frankfort. Other improvements are to be made in the immediate vicinity. Work on the new switchboard is being pushed along.

The Moline city council met as a committee of the whole to discuss the franchise to the Tri-city Automatic Home Telephone Company. Manager Stanton and Attorney Bollinger of the company were present to consider the changes made in the franchise by the council. The parting of the ways came on the payment of $2,000 for the right to use the city streets and alleys for a term of twenty-five years. A roll call on the granting of the franchise resulted in two against and three for.

Forrest Watson, who has been in ccharge of the Homer office of the Douglas County Telephone Company, has been hired to take charge of the telephone system at Hoopeston and will leave in a few days to begin his new duties. With his new position Mr. Watson will receive a substantial raise of salary.

Eureka Farmers' Telephone Company, Eureka, dissolved.

INDIANA.

Francesville, Pulaski county, soon will have a second telephone system, if the public service commission does not prevent it. Wilson Timmons of Francesville petitioned the commission to issue a "certificate of convenience and necessity for the installation" for a new telephone system. The Francesville Telephone Company, owned by A. E. Malszary of Lafayette, is already in the field, and under the public utility act a second system can not be established without the consent of the commission. Mr. Timmons declares in his petition that the present company is not giving satisfactory service and that its toll rates are too high. The company he proposes to organize would charge $1 a month for residence service and $1.50 for telephones used in business houses.

Following a conference with representatives of the traction, telephone and telegraph companies operating in Fort Wayne and its own electricians, the board of works passed a motion that all corporations affected prepare and submit within the next ten days plans for placing underground all wires between Clinton and Harrison streets and Columbia and Washington streets.

A petition was filed with the public service commission by the Pike County Telephone Company asking permission to issue $70,000 worth of 6 per cent twenty-year bonds and $50,000 worth of stock. The money is to be used for extending the lines of the company and general improvements. The stock issue is to be part of an authorized issue of $150,000. The petition was filed by Ezra Mattingly of Washington, Ind., and Edwin K. Spencer of Evansville, president of the company.

IOWA.

The telephone system of Pierce has been sold to M. R. Dutchr, of Norfolk.

President Marshall of the Inter-State Telephone & Telegraph Company, formally accepted a new 20-year franchise from the city of Clinton at a special meeting of the city council. At the same time the telephone company was given permission to change the name from the North-Western Telephone Company to the Inter-State Independent Telephone & Telegraph Company.

The state railway commission has ordered the Bell Telephone Company to connect up with the Hooper Telephone Company at Fremont. The decision was given immediately after a hearing in the district courtroom.

The city of Shenandoah has passed an ordinance requiring all wires to be placed underground.

At a meeting of the Mt. Carroll Mutual Telephone Company held at Mt. Carroll, the directors decided to purchase a new switchboard to be placed in the office in Thomson. The present switchboard has been in use for nine years and has become badly worn, thus the directors feel it a duty to install a new switchboard and insure better service to their subscribers.

At a meeting of representatives from the different mutual lines of Clarinda, the expected action was taken of authorizing the committee to purchase a new switchboard. It will be a convertible common battery switchboard. This, with the cable already ordered, will put the mutual lines in first-class condition. It will, of course, take some weeks to get the material and install the service.

The Des Moines legal department will file suit against the Iowa Tlephone Company for $27,000 rentals for poles and wires in the city streets. Under the city ordinance the rental fee could have been fixed at $40,000. The city made a concession to the company so as to avoid being charged with unfairness.

The Bell Telephone Company is rebuilding its toll line from Grand Island to Broken Bow.

KANSAS.

At a meeting of farmers and Sedgwick residents it was decided that the time was ripe for organizing a new telephone company. The individual pulses are being felt to learn if the supposition is correct. Subscribers are being sought, and if majority of telephone users are in favor of patronizing a stock company backed by local capital, such a company will be organized.

Hanston Telephone Company, Hanston, $1,500; by John Bauer, H. F. Solmans, H. A. Shultz, L. F. Holmes, C. B. Wycoff, J. B. Eakin, W. J. Auerbach.

Elkhart, the new town at the terminal of the Colmer cutoff in Morton county, has started its existence with a public utility scrap on its hands. The town was incorporated only a short time ago, and the citizens have discovered that the day before the incorporation a citizen went over the Oklahoma line and ran a telephone line into the town. As the city was not organized he did not have to secure a franchise. As the system is an interstate affair the city has no control over it. Now the city dads are hunting a way to get the system under the control of the city and get a franchise that will give the town some revenue.

KENTUCKY.

Being dissatisfied with the service rendered by the local telephone company of Lebanon and with a recent raise in the rates, a meeting of citizens was held at the city hall to consider the question. City Attorney Boldrick advised the meeting that the council could take no legal action in the matter against the telephone company, and a resolution was adopted favoring a bond issue of $50,000 to erect and maintain a municipal light and telephone company. A committee of five business men was appointed to take charge of this matter.

Mine operators and business men of Harlan are preparing to organize an independent telephone company, with direct lines between Middlesboro, Harlan and Pineville, unless the Cumberland Telephone & Telegraph Company extends its lines to Harlan, as there is some talk of its doing.

The Bryantsville Telephone Company has been organized in Lower Garrard village, with Charles C. Becker as president, Noah Marsee, vice-president; Dr. Bradley V. Montgomery, secretary, and J. C. Williams, treasurer. The capital stock of the newly organized corporation is $3,000, of which $2,000 is already subscribed, and operations will begin at once. An exchange will be placed in Bryantsville and connection will be made with the Hubble Company, organized a year ago and now doing a thriving business. Connection will probably be made a short distance east of Bryantsville, as the Hubble people already have their lines in operation in that locality.

The sale of the Home Telephone Company of Rockport, Ind., to the Cumberland Telephone and Telegraph Company for $28,000 has been confirmed by the court, and the consolidation of the two plants will begin immediately.

Articles incorporating the Paris Home Telephone and Telegraph Company have been filed in the office of the county clerk. They provide for a capital stock of $30,000, divided into 300 shares at $100 each. Louisville people hold the majority of the stock.

MASSACHUSETTS.

Industrial building in Boston is starting up briskly. The Southern New England Telephone Company is spending $90,000 on a new building of four stories and basement, fireproof brick and concrete construction. The structure is 42x135 feet in size.

MICHIGAN.

The first applications for permission to raise telephone rates by methods provided under the statute passed by the legislature last winter was received by the railroad commission. They are from the Dryden Telephone Company of Dryden, Lapeer county, and the Benzie County Consolidated Telephone Company. The latter is a consolidation of the Bell, the Citizens and a local company in Benzie. The companies will have to produce evidence that the present rates are too low to be profitable before they can get permission to raise rates.

At the annual meeting of the Citizens Telephone Company of Grand Rapids, these directors were re-elected: C. F. Rood, Robert D. Graham, E. B. Fisher, William J. Stuart, C. E. Tarte, Cyrus E. Perkins, Gaius W. Perkins, John B. Martin, P. B. Garvey, Van A. Wallin and C. F. Young.

Pursuant to an order by the Albion council some time ago, the Michigan State Telephone Company will start to remove poles from Superior street and put wires in underground conduits. The improvement is made coincident with the installation of a new system of decorative street lights.

In a meeting of the directors of the Michigan State Telephone Company, an appropriation of $450,000 for general improvements to the Detroit telephone system and the toll lines out of the city was authorized and work will be started immediately on extensive improvements.

Beginning October 1 users of the Citizens telephone in Lansing will pay higher rates, the advances being from $30 to $33, and from $20 to $22. General Manager C. E. Tarte said that it was part of the franchise and contracts of the company that when the Lansing exchange had over 2,00 telephones the rates would advance. The total number of telephones is now 2,900.

The Michigan State Telephone Company has announced at Lake Linden that a new switchboard will be installed in the exchange at that place. The improvement at Lake Linden is a part of a comprehensive improvement in the equipment throughout Houghton county.

The Michigan State Telephone Company, at Ann Arbor, which has taken over the property of the Washtenaw Home Telephone Company, has improvements in its service and holdings under way which will cost more than $119,000, according to E. J. Given, district manager. Estimates for the rebuilding of the Ypsilanti plant at a cost of $25,000 have been approved and new equipment will be installed at Manchester, Milan and Chelsea. In its outside construction work the company has taken into considration the plans of the local park board and wherever possible unsightly poles have been placed in alleys and aerial lines have been removed altogether where possible.

The Michigan State Telephone Company has decided to inaugurate a system of monthly instead of quarterly payments for telephone service. Hereafter the company will present a bill on the first of the month and this must be paid by the 15th or the service will be discontinued.

A one and a half per cent quarterly dividend was declared at a meeting of the directors of the Michigan State Telephone Company. It also approved an expenditure of $450,000 to be used for additions and improvements to the Detroit system. The meeting was attended by President B. E. Sunny, Vice-President A. Burt and Secretary W. E. Mizner, all of Chicago.

Assurances of a modern and up-to-date telephone system in operation before the first of the new year were made recently by A. T. Baker, Sault Saint Marie, manager of the Michigan State Telephone Company. Work has already been started on the new telephone office in the Sault Savings Bank building with a view of moving into the new quarters as soon as the switchboard arrives. A crew of thirty men are now at work installing the new system.

MINNESOTA.

Farmers' Mutual Telephone Association, Minneapolis. Capital, $7,500.

Articles of incorporation for the organization of the Palisade Rural Telephone Company have been filed and officers elected as follows: Dr. J. O. Wernt, president; W. J. Weber, vice-president; H. E. Meyers, secretary and treasurer; Thomas Thompson and H. E. Hansel, directors. The capital stock is $5,000. The company plans to operate a local system and connect also with the Aitkin-Deerwood line at Aitkin.

A metallic telephone line is now in operation between Aitkin and Palisade, and another line is being strung from Remer to Palisade to connect with the Aitkin exchange.

W. G. Giles of Grand Forks has taken charge of the local business of the Northwestern Telephone Exchange Company, having succeeded W. J. Nelson on Sept. 1. Engineer Lowman is expected in the near future, when the contract for the building of the new telephone central station will be let.

Those interested in the construction of a telephone line from Silver Creek district to connect with the Two Harbors exchange held a meeting and perfected their organization and agreed on the articles of incorporation. The name of the new company will be the "Silver Creek Rural Telephone Association." The capital stock will be $5,000, divided into 200 shares of a par value of $25 each. The following officers were elected: Jacob Rafn, president; John Elkhart, vice-president; Otto Ohlund, secretary; John Jacobson, treasurer; Thompson Laird and S. M. Jensen, directors.

The new Northwestern Telephone building is to be erected on Sixth avenue North, on the property adjoining the Times building at St. Cloud. The new structure is to be a two-story building, built entirely of brick, with a pressed brick front and having trimmings of St. Cloud gray granite, and covering 2,700 square feet of ground. The plan for construction is to have the building in horseshoe shape to allow more light to enter. The specifications estimate the building to cost $35,000 and the total fixtures are said to cost nearly $125,000.

MONTANA.

The Farmers' Mutual Telephone Company of Lindsay, Dawson county, and the Fairdale Ranch Company of Lewistown filed

articles of incorporation in the office of Secretary of State A. M. Alderson. The first company has a capital stock of $50,000; directors, W. C. Fellows, P. J. Moe, C. F. Ramey, L. D. Richards, Gust Nelson, J. C. Harrison and B. P. Blackstone, all of Lindsay. The second company has a capitalization of $50,000; directors, F. H. Robinson, E. C. Cutler and H. B. Cutler, all of Lewiston.

MISSOURI.

The Mutual Telephone Company, Lavernia; $2,000. Incorporators, Hugo Kott, W. M. Wiseman, W. E. Warren.

The Home Telephone Company of Joplin has filed an application with the state utilities commission for permission to increase its rentals on business telephones from $2.50 to $4.00 per month and on residence telephones from $2.00 to $2.50. The company contends it cannot make 10 per cent on its investment under the old rates. It has 3,400 telephones in use in Joplin. The application will be investigated.

NEBRASKA.

Beatrice now has only one telephone system, the New Home telephone being cut over. The company has a large force of men at work in order to complete all the work as soon as possible.

The Nebraska state railway commission ordered the Hooper and Bell telephone companies of Lincoln to connect their lines so that the subscribers of the former system will have connections with the outside world, according to the law passed at the last legislature, compelling physical connections of telephone companies.

The Farmers and Merchants Telephone Company of Ragan has been granted permission by the state railway commission to increase its farm line switching rates from 26 cents to 35 cents.

The Lincoln Telephone and Telegraph Company has built itself a new home on the corner of Third street and Denver avenue, at Hastings. The new building will be fireproof and cost approximately $150,000.

The railway commission has issued orders increasing the four-party residence telephone rate at the city of Beatrice from $12 a year to $15 a year and increasing all other rates at the Beatrice exchange $3 a year if the rental price is not paid before the tenth of each month. The commission has authorized an increase of 50 cents a month on business telephones and 25 cents a month on residence telephones at the towns of Grafton and Strang. All of these increases were made on the application of the Lincoln Telephone Company, which has bought and consolidated exchanges at Beatrice, Grafton and Strang.

An important addition to the service-giving department of the Lincoln Telephone and Telegraph Company of Lincoln is being installed. This is a combination board upon which the long distance and farm lines will be placed. It has positions for forty-two operators. This board will take the place of two old ones, and because it does away with the necessity of trunking that often exists wherever two boards are utilized increased promptness and better transmission will result.

The railroad commission authorized the Farmers and Merchants Telephone Company of Ragan to increase its switching charge from 26 to 35 cents a month.

The Lincoln Telephone Company has received permission from the railway commission to add a new class of service to the Waverly, Davey, Raymond and Malcolm exchanges. The company is permitted to make a rate of $3.50 for a business magneto telephone, four or more on a line, including service to the entire Lincoln exchange, also to consider the exchanges at Malcolm and Raymond as one zone, free service to be given to subscribers in the two exchanges, over a metallic trunk line. The exchanges at Waverly and Davey are also to be considered as one zone with the same privileges.

NEW YORK.

The Federal Telephone and Telegraph Company of Buffalo has petitioned the Public Service Commission for determination of a "just and reasonable rate, without regard to franchise limitations."

Following the recent purchase by the New York Telephone Company of the property on the east side of Main street near Depew avenue, Buffalo, work will shortly be begun upon the erection of the new fireproof building. The building itself, the contract for which has been given to the Eastern Concrete Street Company, will cost in the neighborhood of $50,000, and everything that is possible with modern methods will be used to make it as nearly fireproof as possible. At present plans provide allowance for switchboard facilities of 5,000 subscribers' lines, or about 10,000 telephones—however, the building will be so constructed as to allow an expansion to care for twice that number. The cost of the initial telephone equipment will be over $150,000.

The site selected for the new Niagara Falls Bell Telephone Exchange is in the property having a frontage of 65 feet on Walnut avenue and 60 feet on Portage road, and 35 feet on Twelfth street, Niagara Falls.

Public Service Commission of New York has authorized Federal Telephone and Telegraph Company to issue $250,000 7 per cent cumulative preferred stock, to be sold at not less than par.

The New York Telephone Company plans to erect another exchange building on Washington Heights to meet the greatly increased business in this section. The company has just acquired from Minnie E. Hurst a plot 75x200, running through from 175th to 176th street, located 100 feet east of Wadsworth avenue, for the purpose, and it is expected to shortly start work on the project.

The New York Telephone Company took title to a tract of unoccupied land, situated at the corner of Main and Prospect streets, in the heart of the business section of Huntington, L. I. The tract comprises about a half acre and was owned by George Grau. The price paid was $10,000. It is understood that the telephone company will begin the erection of a large building on this site, operations to commence October 1, and that the entire work on the island, east of Hempstead, will be centered in this building.

NORTH CAROLINA.

Many of the big poles that have been used for telegraph and telephones are being pulled up and removed from the main streets of Raleigh. This is a concession to the civic sense and makes for safety because of the frequency of broken cables and crossed wires. The worst of them will be taken off in due time.

NORTH DAKOTA.

A new farmers' telephone line is to be constructed out of Minto. The new line is known as the Harriston Telephone Company and the officers are John Popowski, president, and Galen McDivitt, secretary and treasurer.

OHIO.

The Public Utilities Commission has given its approval to a bond issue of $6,000 for the Pataskala Farmers' Telephone Company. The money is to be used in paying off indebtedness and in making extensions and improvements to the property.

The Troy Telephone Company wants to erect a handsome new exchange in Troy, and has asked the approval of the utilities commission to a bond issue of $75,000. Of the entire issue $40,000 is to be used to pay off indebtedness and the other $35,000 for the purpose of building a new exchange.

Application was made jointly by the Newark Telephone Company and the Somerset Telephone Company by authority of the public utilities commission to enter into a leasing contract. The application proposes that the Newark company will lease the Somerset company for a term of 99 years. It is stipulated that an annual rental will be paid the stockholders of the Somerset company equal to 6 per cent on the $25,000 stock of that company.

OKLAHOMA.

A petition has been filed requesting the corporation commission to issue an order directing the Pioneer Telephone and Telegraph Company to erect a new building at Sallisaw. The present building, the petition states, is "an old frame, one-story box house, unsanitary and inadequate to meet present-day needs." The petition also requests the commission to issue an order directing the company to install more modern and improved equipment.

There will be an extension of the Sand Springs Telephone Company's lines from Sand Springs westward and to the north inside the next few months. One of the points which is to be touched, it is understood, is Wekiawa. The Sand Springs company is preparing to erect its own building at once. The growth of the company's business is a rapid one and more suitable quarters have become a necessity.

OREGON.

John B. Coffey, as receiver of the Northwestern Long Distance Telephone Company, has petitioned the public service commission for permission to reduce the long distance telephone rate between Seattle and Edmonds to meet a corresponding reduction proposed by the Pacific Telephone and Telegraph Company.

A gang of linemen has started work on a long-distance telephone line which will connect the Inland Co-operative system of Pullman with the Home Telephone Company in Spokane. Another gang is working from Palouse and as soon as this line is completed Pullman patrons of the Co-operative concern will be given long-distance service to Spokane, northern Idaho, Mon-

tana and other points. Long-distance rates will be considerably reduced.

PENNSYLVANIA.

The plants and properties of the Consolidated Telephone Companies of Pennsylvania at Allentown and underlying companies have been sold to Alvin Markle of Hazleton; Colonel H. C. Trexler of Allentown, William B. Given of New York, John Graham of Newville, Pa., and John Gibson, in the interests of the reorganization. There was only one bid of $50,000, subject to all the mortgages of the underlying companies.

Directors of the State Belt Telephone Company, Philadelphia, have declared a dividend and decided to rebuild the lines in Nazareth and Bangor.

F. W. Van Loon has been awarded the contract for the alterations and additions to the building at the northeast corner of Seventeenth and Poplar streets, Philadelphia, for the Bell Telephone Company.

Colver Telephone Company, Colver, Cambria county; capital, $5,000.

Reimersburg Telephone Company, Reimersburg; capital, $6,000.

The Central District Telephone Company has let a contract to the Thompson-Starrett Company for improvements to its building at Seventh avenue and Montour way, Pittsburg, to cost $8,000.

The Bell Telephone Company has about completed the placing of a quarter of a million dollars' worth of wire under the streets of Philadelphia, the largest single operation of its kind ever undertaken in the city. The cables comprised 311 reels, which were brought here on a train of 34 cars. The reels weighed from 3,000 to 6,000 pounds each, carrying from 300 to 600 pairs of wires, of an aggregate length of 70,000,000 feet—about 13,000 miles—enough to span more than half the earth.

TENNESSEE.

The telephone poles are to be banished in Bristol. As a result of the agitation against the poles, especially in the white way district of the city, the Bristol Telephone Company, through Albert Parlett, its president, announced that as soon as its franchise could be amended so as to permit, it would begin work of putting its wires and cables under ground. The board of commissioners of Bristol, Tenn., and the city council of Bristol, Va., will at once grant the company permission to put in conduits and the pole lines in the business district will be removed as soon as possible.

At a well-attended and enthusiastic meeting of the stockholders and directors of the Lebanon Home Telephone Company, the committee appointed at a previous meeting to secure funds sufficient to cover the indebtedness of the company—about $5,000 in all—reported that the entire amount had been secured, which seems to insure the future success of the company and its continued operation in this county. J. W. Sellars was elected vice-president of the company and A. J. Casey, treasurer and general manager of the company, both of whom are prominent citizens. It is stated that there are nearly a thousand farmers' lines in the county, and that an effort will be made in the near future to consolidate these with the Home Telephone Company's lines.

TEXAS.

At Beaumont, contract for the South Texas Telephone Company's proposed new home will be let. The company's new home will be located at the corner of Waco avenue and Sixth street when completed. It will be a modern structure in every respect, as applied to the requirements of an up-to-date telephone office. Unofficial estimates place the cost at approximately $35,000.

The Southwestern Telegraph and Telephone Company has announced that it will erect a modern office building in Sherman. The structure will be three stories and basement, and the blue prints show a building that will cost between $40,000 and $50,000. It is stated that the basement will be used for the heavy machinery, the first floor for the commercial offices and the offices of the heads of the various departments, the second story for the rest rooms, cloak rooms and other modern conveniences for the operators, and the third story for the operating department. The building will be located on the corner of Lamar and Walnut streets, and will be completed at the earliest possible date.

Orange Home Telephone Company crews have started the work of rebuilding the exchange at Galveston, recently purchased from the Brazos Valley Company. The Southwestern Telegraph and Telephone Company has built an Orange-Newton toll lines.

Certificates of dissolution were filed by the Independent Telephone Company, Chillicothe.

The city council of Ennis has granted a fifteen-year franchise to the Brazos Valley Telephone Company, successor to the Ellis County Independent Telephone Company.

The Orange Home Telephone Exchange, valued at about $30,000, has been sold to the Brazos Valley Telegraph and Telephone Company, which has assumed the management. Miss Alma Mason, who was formerly chief operator, has been employed as local manager. The new owners propose to put the exchange in first-class condition and have their crews here now to begin work.

The Mutual Telephone Company, Lavernia; capital stock, $2,000. Incorporators: Hugo Kott, W. M. Wiseman, W. E. Warren.

John Hoffman was granted permission by the county commissioners at San Antonio to extend a telephone line on the Culebra Road from the Kuentz gin to the county line. All work will be done under the supervision of the county highway engineer. The report of the county tax collector for the month of August was checked and approved and the warrants ordered drawn and signed.

The Lazare Telephone Company has sold to W. B. Hampton of Quanah its telephone plant.

The work of installing a new telephone plant at Plainview, of the central energy or flashlight type, to cost $40,000, has been begun by the Southwestern Telephone Company.

The plans for the South Texas Telephone Company's building, corner Sixth and Beaumont, Port Arthur, have been completed. The building is to be of brick and concrete, 50x100 feet ground space and two stories high, and is intended as a central for the local business, which has increased beyond capacity of present quarters. The company will begin moving its lines from streets to alleys and will have to set near 1,000 poles. There will be an underground cable, doing away with overhead wires in the business center.

The Southwestern Telegraph and Telephone Company has been working for months installing an entirely new equipment and greatly increasing the service at Teague.

Several farmers near Kenney have organized to build a new telephone line to Kenney, a distance of about four miles, to be called the Lone Star telephone line.

UTAH.

S. F. Halverson offered $200 for the Independent Telephone building on 24th street and Hudson avenue, and the bid was accepted. Mr. Halverson will be required to remove the building for the opening of Hudson avenue, between 23rd and 24th streets. This structure cost when erected, $35,000.

VIRGINIA.

The Tidewater Telephone Company of Fredericksburg has elected the following officers. A. W. Withers, president; W. DeW. Dimmock, vice-president and general manager; H. E. Hutcheson, secretary and treasurer. Board of directors, A. W. Withers, John L. Farinholt, W. E. Corr, R. S. Bristow, J. Marshall Lewis, G. S. Marchant, I. B. and B. F. Weaver, W. DeW. Dimmock and J. W. Downs.

Farmers' Telephone Company of Stuart. H. L. Wimbish, president; A. W. Williams, vice-president, Stuart; W. M. Tatum, secretary, Stella; J. B. Beach, Stuart, and J. M. Hooker, Elamsville. Capital, $2,880 to $4,968, $36 par value. Purposes—To take over and operate the Patrick County Telephone Company. Incorporated at Stuart and to conduct general telephone business in Patrick, Floyd and Henry counties.

WISCONSIN.

The East Valley Telephone Company filed articles of incorporation with the registrar of deeds today. The capital stock is fixed at $20,000 and the incorporators are A. G. Bartelt, Bertha Bartelt and August C. Bartelt. The company's property is located in the town of Auburn.

The Wisconsin Telephone Company in Beloit will begin making extensions in its system, the total cost of which will be about $30,000. The present system is taxed to the utmost, about 80 per cent of the plant being filled up, which is above the limit ordinarily observed.

There is but one telephone system in Appleton, the final consolidation of the Fox River Company with the Wisconsin Telephone Company having taken place. There are about 4,500 telephone subscribers in the city and vicinity.

The Kenosha city council will enforce the ordinance providing that wires be placed under ground. Telephone and electric light companies have been instructed to place conduits under Park street, just ordered paved.

Permission was granted to Rock County Telephone Company by the Rockford council to build in accordance with the specifications and plans of the architects. This was done after an investigation satisfied the council that the type of construction was entirely safe and fire-resistant.